THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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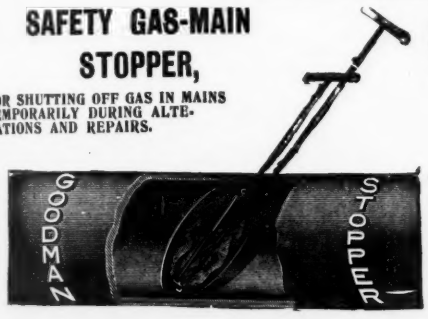

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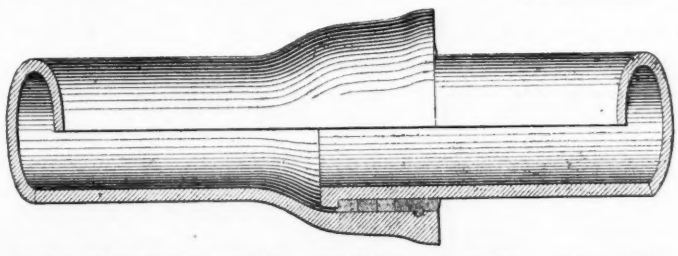

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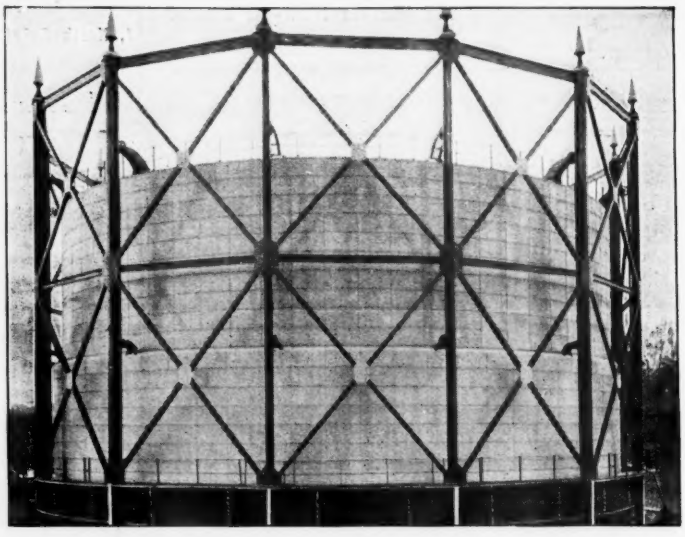

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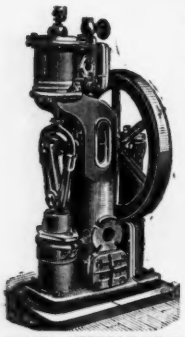

Fig. 703. "SINGLE RAM" STEAM-PUMP.

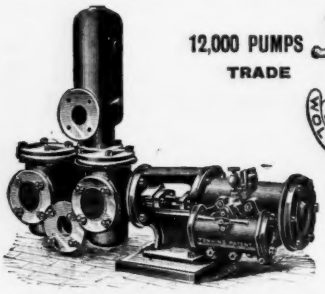

Fig. 898. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

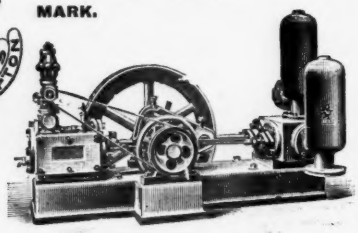

Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

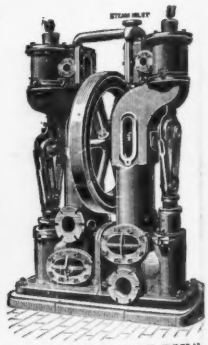

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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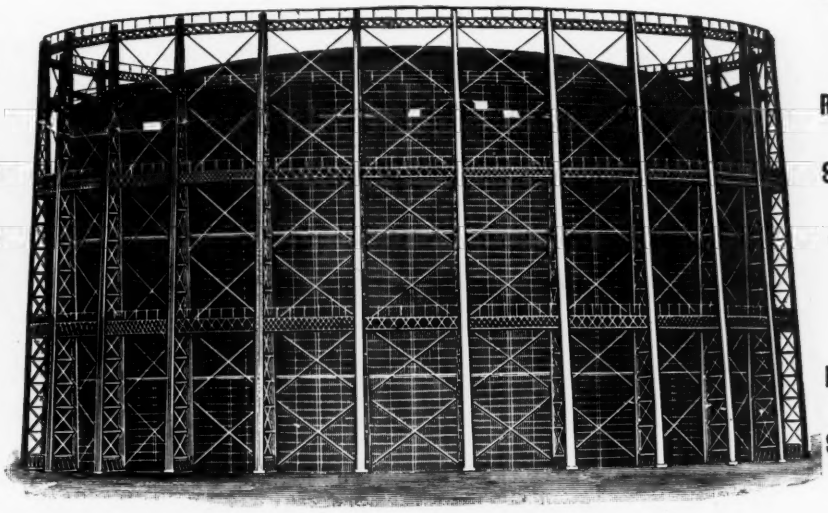

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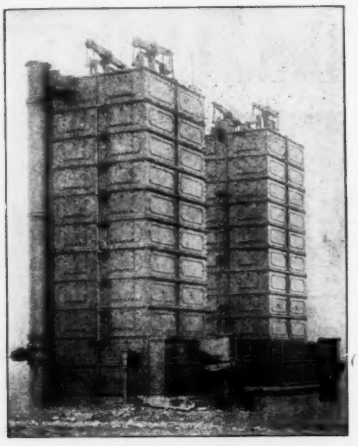

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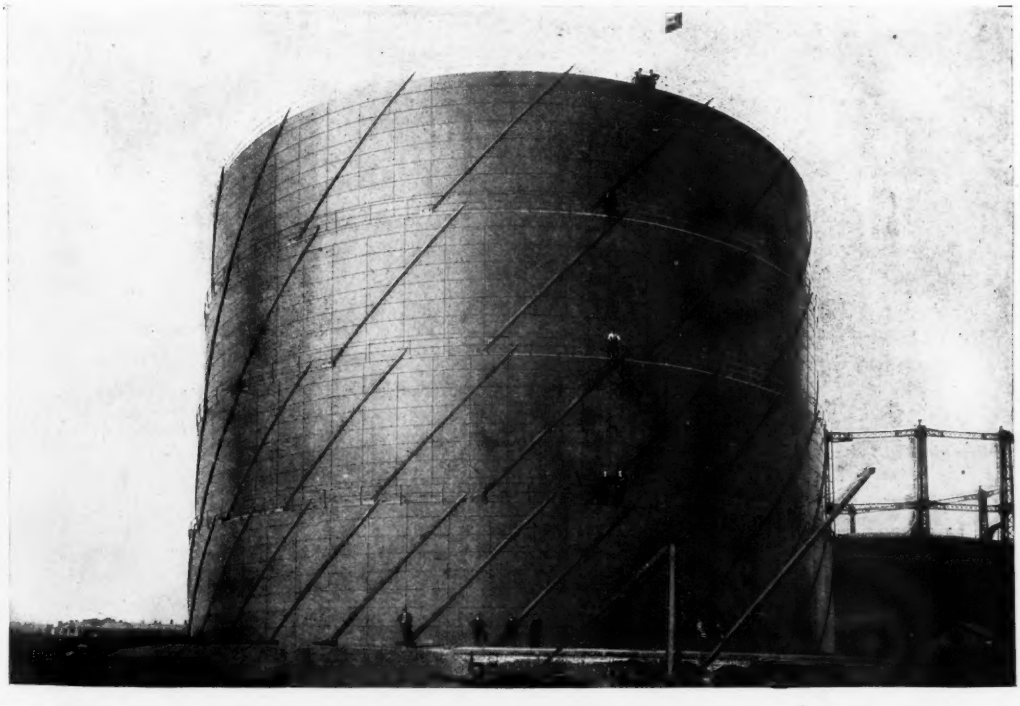

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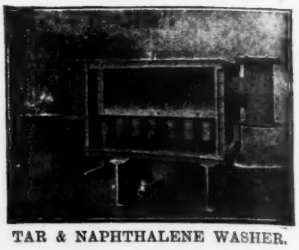

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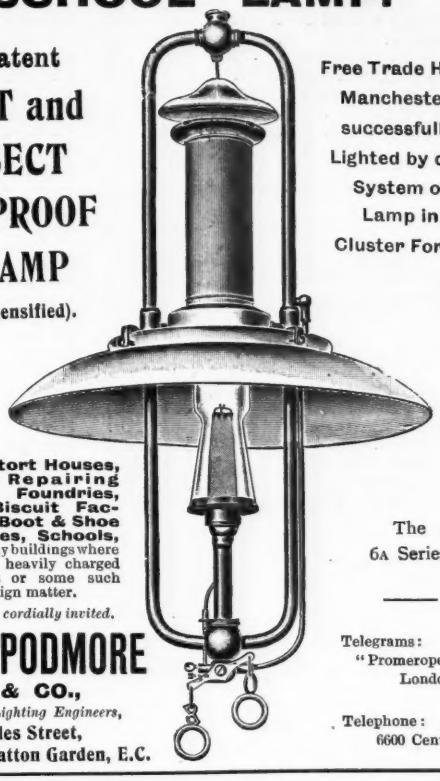

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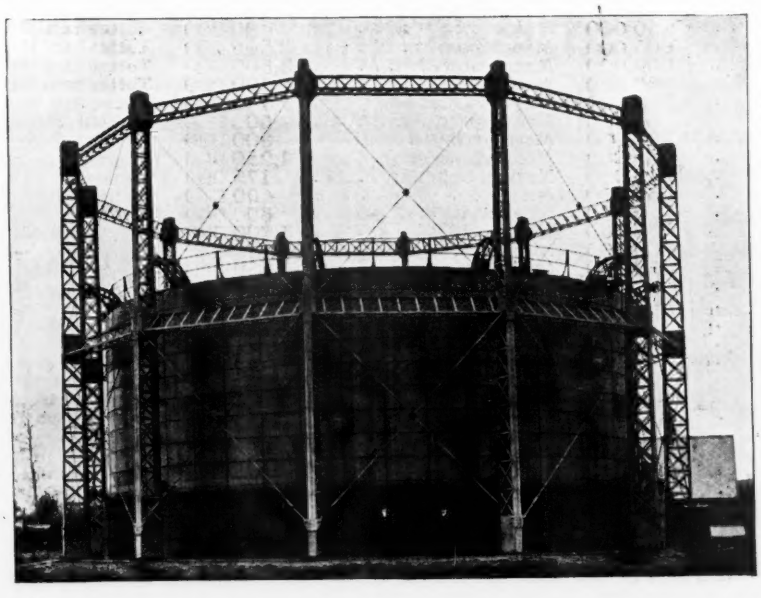

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Coventry (2nd)	600,000	Manchester (2nd)	3,500,000	Tottenham (5th)	1,000,000
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Croydon (2nd)	625,000	Middlesbrough	1,250,000	Verviers, Belgium	1,000,000
Croydon (3rd)	625,000	Namur, Belgium	175,000	Vienna	3,500,000
Croydon (4th)	550,000	Nelson	400,000	Vienna (2nd)	2,500,000
Debreczin, Hungary	100,000	Newburgh, N.Y.	600,000	Waltham	400,000
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Deventer (2nd)	200,000	Nictheroy, Brazil	250,000	Watford	300,000
Dorking	150,000	North Middlesex	150,000	Watford (2nd)	350,000
Dublin	2,000,000	North Middlesex (2nd)	200,000	Wellington, N.Z.	350,000
Dublin (2nd)	2,000,000	North Middlesex (3rd)	75,000	West Bromwich	550,000
Dublin (3rd)	650,000	Norwich	1,000,000	West Ham	1,500,000
Dundee	1,500,000	Norwich (2nd)	300,000	West Ham (2nd)	800,000
Dunedin, N.Z.	150,000	Norwich (3rd)	500,000	Weston-super-Mare	350,000
Dunedin, N.Z. (2nd)	275,000	Nottingham	1,000,000	Weston (2nd)	350,000
Durham	200,000	Nuneaton	125,000	Wexford, Ireland	100,000
Düsseldorf, Germany	1,000,000	Oberhausen, Germany	175,000	Wiesbaden, Germany	850,000
Eastbourne	1,250,000	Oldenburg, Germany	200,000	Winchester	225,000
Edinburgh	2,000,000	Ostend, Belgium	100,000	Winchester (2nd)	125,000
Epsom	225,000	Ostend (2nd)	200,000	Wolverhampton	1,500,000
Epsom (2nd)	300,000	Perth, W.A.	125,000	Zwolle, Holland	200,000
Falmouth	150,000	Poole	1,500,000	Zwolle (2nd)	200,000

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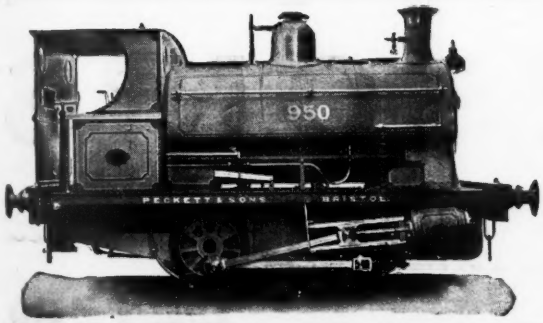

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EDITORIAL NOTES—GAS, &c.

The Proposed International Unit of Light.

THE paper by Mr. C. C. Paterson of the National Physical Laboratory, which was reproduced in last week's "JOURNAL" (p. 383) and the communication by Herr E. Brodhun, of the Reichsanstalt, of which an abstract translation was given the week before last (p. 312), contain statements in regard to the proposed international unit of light and to the Harcourt ten-candle pentane lamp which raise doubts as to the expediency of the immediate general acceptance of the understanding at which the National Physical Laboratory has recently announced that it has arrived with the Bureau of Standards of the United States and the Laboratoire Central d'Électricité of France. These statements are extremely disconcerting to those—ourselves among the number—who had been led to believe, by the announcement of the National Physical Laboratory (reproduced in the "JOURNAL" for May 18 last, p. 439), that a satisfactory agreement as to the establishment of an international unit of light had been effected, in regard to the electrical industries at least of three countries, and was in the near future likely to receive general approval. In last week's "JOURNAL," however, it was reported (p. 385) that the Dutch Gas Managers' Association had decided to defer accepting the proposed international unit until it had been brought before, and had been adopted by, the International Photometric Commission which meets at Zurich next year. In view of the doubts raised by Mr. Paterson's and Herr Brodhun's communications, this attitude of the Dutch Gas Association seems eminently reasonable; and it will doubtless be followed by other bodies. The whole question can then be exhaustively debated by the delegates from the various countries represented on the International Photometric Commission; and any recommendation which that body may ultimately make as to the adoption of an international unit of light will no doubt be loyally accepted by the gas interests throughout the world.

Pending such a settlement of the matter, it may be worth while indicating what are the chief points at issue. So far as the gas industry in this country is concerned, the unit of light must represent the average value of the standard spermaceti candle as prescribed in Gas Acts and as used in gas-testing rooms for many years. It has not been disputed that the Harcourt ten-candle lamp as prescribed by the Gas Referees in 1898 for use in official gas testings in the Metropolis faithfully reproduced the average value of ten parliamentary standard candles. But since its introduction, various propositions have been made—by the National Physical Laboratory among others—to define standard conditions for its use. In these conditions it is to be accepted as exactly ten candles. It is evident, however, that in gas testing the value of ten candles which the lamp originally had must be preserved—that is to say, it is ten candles, neither more nor less, in the average conditions of its use in a well-ventilated gas-testing room in this country. These conditions are a temperature of 60° Fahr., a barometric pressure of 30 inches, and an atmosphere containing about 1 per cent. of moisture, about 0·05 per cent. of carbonic acid, and the proportion of oxygen corresponding with that degree of vitiation of normal atmospheric air. There is reason to believe that the light of the argand gas-flame varies approximately in the same ratio as the Harcourt lamp flame with changes in atmospheric conditions; so that hitherto it has not been deemed necessary in gas testing to make corrections for changes in the light of the lamp consequent on variations in the atmosphere. But when for other purposes standard atmospheric conditions have to be prescribed for the lamp, it is clear that they must be those which we have just defined, if the lamp is to have precisely the same value of ten candles which it has had in gas testing since its introduction in 1898. If the lamp were acknowledged to have a value of ten candles exactly in some other atmospheric conditions, it would follow almost indubitably that it would have in gas-testing conditions a value differing (perhaps only by a little) from ten candles—that is to say, the standard by which gas is tested would have been altered, and 14-candle gas as hitherto defined would become (say) 14·1 or 13·9 candles. From the commercial standpoint merely, it is quite conceivable that an acknowledgment that the Harcourt lamp represents exactly ten candles in conditions other than those which prevail normally in gas-testing rooms, may lead to a gas company incurring a forfeiture in respect of the quality of its gas which in present conditions it would escape.

Now according to Mr. Paterson, the value of the proposed international candle is to be one-tenth of the light of the Harcourt lamp burning in conditions which are not the normal conditions of an official gas-testing room in this country. Hence it seems almost certain that the proposed international candle will differ from the standard candle by which alone gas can be legally tested in this country. After proposing at the last session of the International Photometric Commission at Zurich that the standard degree of atmospheric humidity for the lamp should be 1 per cent., Mr. Paterson has since proposed to alter it to 0·8 per cent., whence we might infer that London testing-rooms have a drier atmosphere than those of Berlin, for which in connection with the Hefner lamp 0·88 per cent. has been accepted for many years as standard humidity. It seems likely that the original 1 per cent. more nearly represents the average degree of humidity of a London gas-testing room. We are not, in making this statement, concerned with the error which the National Physical Laboratory states that it made in its early measurements, and for which Mr. Paterson says that corrections have now been applied. We are speaking of the absolute amount of moisture in the air. Incidentally, however, we may remark that Mr. Paterson would be doing a public service if he would explain by what formula readings of the ordinary hygrometer can be converted into the equivalent readings of the ventilating Assmann instrument. He must have found and used such a formula for the correction to which he refers of his original ratios; and many photometrists who have hitherto noted only the readings of the ordinary hygrometer would be glad to be in a position to make the same conversion. Further, the National Physical Laboratory should recognize that the normal conditions of barometric pressure and temperature for gas testing in this country must be specified as the conditions at which the Harcourt lamp has its standard value. Hitherto it has specified no temperature, and a barometric pressure of 760 mm. or 29·9 inches, instead of 30 inches. Also the amount of carbonic acid and (or) oxygen in the atmosphere in standard testing conditions should be defined. Probably the effect of both moisture and carbonic acid on the light of flames is largely indirect and dependent on the corresponding diminution in the proportion of oxygen in the air.

Herr Brodhun's most substantial grievance against the adoption of the Harcourt lamp as the basis of the proposed international candle appears to be that Mr. Paterson has stated that he has found differences of as much as 0·75 per cent. in the light afforded by two different specimens of the lamp. If differences approaching this order of magnitude can in reality be found between two lamps complying with the specification, it must be admitted that the lamp is defective in one of the most essential qualifications which a standard should possess. But we think it likely that Mr. Paterson can now inform us that the difference referred to occurred in an isolated case for which some satisfactory explanation—such as departure from specification in one of the lamps, or an accidental error in the photometry—was ultimately found. Anyhow, it is clear that the proposed international candle will have to be more thoroughly investigated before it can receive general acceptance. The meeting of the International Photometric Commission at Zurich next year should present a suitable opportunity for the settlement of an international unit of light, and of the conditions of its establishment and reproduction.

A communication by Dr. H. Krüss, of Hamburg, who is

one of the members of the International Commission, on the proposed International Unit of Light appears in the "Journal für Gasbeleuchtung" of the 14th inst. which has just come to hand. From the abstract translation of it which is given on another page of to-day's "JOURNAL," it will be seen that there are other good reasons why the proposed international unit should not be adopted without further serious consideration of its merits.

Administration in South London.

IT was a masterly exposition of gas administrative work with which the Chairman of the South Metropolitan Gas Company (Mr. Charles Carpenter) interested the proprietors last Wednesday; and those of the latter who think anything about what they then heard must be convinced that the direction of a large Gas Company in these days requires men of many parts—observant, watchful, prudent, and far-seeing. While taking every means to preserve business, to advance it, to produce economies, they have ever to be alert in seeking opportunities for creating fresh markets. There can be no question that to the large gas undertakings of the country, the gas industry as a whole are under indebtedness for the lead they have given in many ways. In that one simple present necessity of keeping in constant touch with the consumers, the companies with extensive areas to serve have adopted a variety of plans; and only last week we were able to describe the latest development of the South Metropolitan Gas Company in the show gas-house, of which they have more than one in their area. The free cleaning and fuel replenishing of gas-fires is another method; and the converting of water-slide chandeliers into fixtures is yet another. That this latter work is being thoroughly done, is testified to by the statement of the Chairman, that the Company have now an accurate record of every unregenerate chandelier that exists in their area of 50 square miles; and the Company are not going to cease their efforts till the last movable appliance of the kind is converted into an article of absolute safety. Such work—such interest—cannot fail to make a good impression.

As commercial and not philanthropic institutions, it is the correct thing for gas undertakings to make matters of this kind known on every convenient opportunity; and to cultivate as far as possible the sense of a community of interest. No Company have worked in this direction with more energy than the South Metropolitan Company; and more particularly since the foundation at their works, some twenty years ago, of the complete co-partnership. The taking into co-partnership of the workers themselves is a source of business stability to the concern. The captious may be disposed to question this, by pointing to the fact that the consumption of gas has been standing at about a level line just recently. Those who know the area are the best judges of the fact that local and general circumstances more than any increase in competition have been the cause of the marking-time of the Company in regard to consumption. The shifting of householders, the depression in trade, the economy of the incandescent gas-burner, and the increase in the price of gas a while ago from 2s. to 2s. 3d. (it is now 2s. 2d.), and the propensity to economy on the part of householders and shopkeepers when business is not brisk, are all factors inimical to advance. That the diagnosis is true is plainly proved by the condition of the electric light undertakings in the district. They are not in so flourishing a state as the companies and the local councils who own those undertakings could fairly wish; and the cheapness of the gas supply, the extensive class of householders in the area who cannot afford to be consumers of electricity, and the activity of the Gas Company, are all influences which it would be to the advantage of electricity if non-existent. The very conditions that in part are their drawbacks are the strength of the Gas Company; and, with revived trade and the immigration of householders, this will be seen. The apparent decrease of 0·26 per cent. in the consumption of gas in the half year compared with the corresponding period of 1908, is not a decrease in fact. Eliminating the consumption of Feb. 29 last year, so as to give correspondence in days, the decrease is converted into an increase of 0·39 per cent., which result is, under the circumstances, very satisfactory. In addition, new connections are constantly being augmented; and, financially, the Company are in a strong position.

In a few striking passages at the commencement of the address, the consumers were shown what an immense benefit the sliding-scale, or co-partnership, principle in gas supply—the principle established by the eminent late Chairman—has been to them. The Company's standard price is 3s. 1d.; gas has been selling lately at 2s. 3d. But the 10d. difference between the 3s. 1d. and the 2s. 3d., Mr. Carpenter points out, has represented no less than £505,389 per annum to the consumers. He might have gone further. It will represent more under the 2s. 2d. price; and it has represented more under the former 2s. price. There was another thing the Chairman did not tell the consumers, and that is that the £1 6s. 8d. per cent. the proprietors get beyond the standard dividend of 4 per cent. only aggregates per annum to between one-sixth and one-fifth of their own gain of £505,389 by being supplied with gas at 10d. below the standard price. When served at the 2s. price, too, the consumers were netting much more than their fair proportion; seeing that the proprietors were not receiving their statutory share. In view of all of which, the Chairman did not exceed his right in claiming that the Company have rendered good service for the consumers, and have been model employers; and that the proprietors deserve to receive their meed of attention likewise. This is an endorsement of the view that was expressed by Sir George Livesey when approaching the end of his Chairmanship of the Company.

The question of coal and the unrest among the miners furnished a subject for Mr. Carpenter; and his comments, in the main, reflect the judgment of the gas industry. Though contracts have been settled at lower prices for the current year, the most gifted in perception evade any prediction as to what the future has in store. We are not out of the wood yet over the Eight Hours Act; and there is a feeling among those behind the scenes that the introduction next January of fresh conditions, in Northumberland and Durham, necessitated by the Act may lead to some temporary disorganization. The fear may not be well-founded; it may be but a phantasm engendered by the recent critical times through which the coal world has been drifting, and the importance of which it is folly to minimize. A stoppage of only two or three weeks' duration would have a vast effect in depleting stocks; and there would be an aftermath of difficulty, precedent assures, in the facts that the normal output is not immediately attained on resumption of work, nor can deliveries of ordinary regularity be depended upon for some weeks after in the scramble for supplies. Let these remarks not be mistaken. The future simply embraces a change in condition that may or may not be amicably arranged; but it is an occasion for protective measures, even by those whose supplies come from fields other than Northumberland and Durham. For the perpetual antagonism that exists in the coal world between capital and labour, the South Metropolitan Gas Company, with their twenty years' experience of co-partnership, naturally cannot find any excuse. But there is the old fear among the miners as to co-partnership doing away with the power to strike. What if it does, if co-incidentally it does away with the necessity for striking, and brings about automatically just relationships between owner and worker according to market conditions?

There were several other attractive features in the Chairman's address, all bearing more or less upon the diverse questions that have to engage the attention of gas administrations. Not an unimportant one is the effort to create new markets for residual products, in view of the increased, and still increasing, production. Another is the changed and the changing character of the work in the retort-house. Mr. Carpenter is one of those who has a profound faith in retort-house operations contributing more than they have yet done to the prosperity of the gas industry. Though the Company are now selling upwards of 11,000 cubic feet of gas per ton of coal carbonized, this is not by any means regarded as the high-water mark. With the growth of experience as to the advantage of carbonizing in heavier weights and for longer periods, with accompanying improvement in residuals, the hopes of the "Coalite" people must be correspondingly on the wane—as is the market value of their shares. Though the Chairman did not mention the coalite system by name, his words indicate that it has no sympathizer in him. "We "are gas manufacturers first and foremost, and, broadly "speaking, the greater the proportion of the weight of the "raw coal we can turn into gas the better." More especially must this be the case if the residuals are not depreciated in the process. So far from this being the case, the residuals are all improved in the new system of working—the tar is better, the coke is better, and the ammonia is somewhat more. The views of the administrators of the Company are broad and comprehensive; and the affairs—present and future—of the undertaking stand on a sure foundation.

Complete Freedom or Calorific Power?

The good account and the encouraging signs of trade revival induced the Chairman (Mr. W. G. Bradshaw) to take the brightest view of the circumstances of the hour at the Commercial Gas Company's meeting last Thursday. Mr. Bradshaw is never given to pessimism; and however dull may be the environment in regard to business, he has generally a cheerful way, in his references, of looking beyond and finding there something for gratification. There was one thing on this occasion for which he had not a good word, and could only speak of with regret, and regard as retrograde. That is the acceptance by the Gaslight and Coke Company of a calorific power standard. But we think he looks upon it in too serious a light. The Gaslight and Coke Company, quite as much as Mr. Bradshaw, regret they had to conclude that it was expedient for them to accept the standard, though the illuminating power test still survives. This, however, was only a matter of agreement between two bodies outside Parliament. Parliament itself has not forced a calorific test upon anyone; and Committees of both Houses have only recently refused—on the objections among others of the Governor of the Gaslight and Coke Company—the imposition of such a standard and test on the Coatbridge Gas Company, although there was strong pleading for it on behalf of the Council. And we do not for a moment suppose that, unless there be agreement between parties, Parliament will inflict a calorific power standard and test on any gas undertaking, so long as illuminating power is the recognized parliamentary standard of quality. Mr. Bradshaw has practically the whole of the technical opinion in the gas industry with him when he says that there is no longer real necessity for any kind of test of gas. But the matter has to be considered from a practical and commonsense standpoint; and, from that standpoint, there is the recognition that Parliament will not grant protection and privileges to gas suppliers without—however desirable absolute freedom may be—some form of control over the quality of the supply. No one would be more willing to fight for that freedom than we should be, if we could bring ourselves to believe that the fight would not be a futile one, and so a miserable failure. If it be recognized that Parliament will insist, as a condition of the dislodging of the illuminating power standard, that another, with a different basis, shall be installed in its place, then Mr. Bradshaw has advanced the best of arguments in favour of the calorific power test being the one, when he tells us that no less than 50 per cent. of the gas distributed in the East-end of London is now consumed in the day time. Bearing this in mind, and that incandescent lighting has taken such a vast hold of public favour, it follows that there can only be a fragmentary percentage of gas now used for its naked luminosity.

The Work of the Small Undertaking.

To a considerable extent, the technical matter at the Irish Association meeting was addressed to the managers of small gas-works. The President (Mr. F. J. Eustace, of Tullamore) gave course to the proceedings in this direction. Though competition is rife all around, he has, and very properly, a robust faith in the gas industry; and he is firmly of opinion that the best interests of the portion of the industry that is represented by the small works will be served most effectively by the managers keeping themselves well tutored in current technical subjects. There is, it is to be feared, a disposition on the part of some managers of small gas-works (they constitute the minority) to think that the higher polemics of the hour are not for them. That is an error. Ambition should be to keep oneself abreast of—and not merely even with—the requirements of the existing position. The time is not wasted that is spent in the acquisition of knowledge appertaining to one's profession; and there are not a few pickings to be made by managers of the smallest of undertakings from the topics of present interest and controversy that can receive almost immediate application. The advances in gas manufacture and applications have no absolute delimitation in respect of the dimensions of the works to which they can be applied. A refusal to glean from the fresh knowledge as it is unfolded is akin also to the refusal of personal advancement. To make the best out of one's works is to make the best of one's opportunities and to prove one's worth; and that goes far in commending services to reward, and in proving qualification for higher positions. Small gas-works, with their heavy capitals as measured by outputs, and their all too frequently wasteful manufacturing results, give excellent scope for the application of knowledge to the production of economy, by the improving of working results and financial status. And outside the gas-works, there is much to be done to keep at bay competitors, and to put the undertakings on an increasingly sound foundation.

A special part of the address served as proof that a sulphate of ammonia plant can very profitably be applied to a works even of as low an output as 10 million cubic feet. Frequently, small gas-works are isolated; and the transport of the liquor is thus a heavy expense. Frequently, too, these works are in a favoured position for readily disposing of the sulphate produced. On the other hand, as Mr. H. W. Saville, of Drogheda, showed in his paper, sulphate plants in small works can easily find a short cut to negligent and uneconomical working. The intermittent working of the sulphate plant in works of minor degree is perhaps responsible for carelessness here and there; and for, in consequence of the latter, the production of an indifferent salt, and for a large percentage of the ammonia in the liquor going to waste, with resultant heavy working cost and fuel account, and loss of profit. It is an interesting narrative in Mr. Saville's paper of the defective condition in which he found the sulphate plant on taking charge of the Drogheda works, of the way in which he proceeded to discover the sources of the difficulties, of the remedies applied, and of the favourable results attained. Apart from his methods, the story should serve to stimulate others in small works to see that they are getting the utmost procurable from their liquor. Perhaps the most interesting part of the communication is the description of the simple method he has adopted for preheating, and maintaining at a constant temperature, the liquor being supplied to the still by utilizing the heat of the spent liquor, supplemented by steam. There is nothing new about a preliminary heating of the liquor supplied to the still. There have for some years been methods of doing this incorporated with various plants, with economy in the result, in time and fuel, and through the larger recovery of ammonia. The simplicity of Mr. Saville's attachment to his plant for the purpose of utilizing the waste heat of the spent liquor, and giving the preliminary heating to the liquor passing to the still, is alone a sufficient justification for his paper.

The other paper by Mr. J. E. Enright, of Tralee, covered a vast amount of ground of a diverse nature, which was permitted by the ample heading, "Some Notes and Queries "on the Control of Small Gas Undertakings." The subjects extended from competition to the recognition, or rather want of recognition, of the position of the gas manager in certain undertakings. The paper might conveniently and usefully have been split up into two or three; for such a variety of topic cannot be adequately dealt with in a single discussion. Among the points raised, Mr. Enright considers that, in those towns where differential prices exist for lighting on the one hand and cooking and heating on the other in the case of ordinary consumers, and the single ordinary lighting price prevails for both purposes (with an excess charge) in the case of the prepayment consumers, justice is not done to the latter in respect of the portion of the gas used for cooking purposes. The prepayment consumer has, time and again, had several gas managers take up the cudgels in his defence over the question of his payments; but the old method of payment continues its course without abatement in popularity. There are confessedly matters that would be all the better for remedying; but the difficulty is to remedy them without introducing an undesirable complication.

To allow the slot consumer a differential price for lighting and cooking would not generally commend itself. It would mean either the employment of two meters in one house for a comparatively small consumption, or a discount meter with the cooker, and an allowance for the cooking gas from the total payments into the money-box. With the former, the additional expenditure for the second meter would add an unnecessary cost, which would considerably reduce, on the consumption of the prepayment consumer, the benefit allowable by the adoption of the differential system. Furthermore, the slot consumer, anyway many of this class of consumer, would be unable to appreciate why the gas used for lighting should be more valuable than the gas for cooking. The commercial principles that govern these matters are foreign to, and not understandable by, many of them. A far better plan, in our opinion, is to reduce the price of the whole of the domestic gas to a lower level. Mr. Enright assumes (his figures would not apply to places within our knowledge)

that a prepayment consumer using 12,000 cubic feet of gas, consumes 8000 cubic feet of that amount for purposes other than lighting. Very well. Suppose—ignoring the common prepayment excess—the consumer be charged (as the ordinary consumers are in one case quoted in the paper) 5s. 5d. per 1000 feet for lighting, and 4s. 2d. for cooking, his 4000 feet of lighting gas would cost him £1 1s. 8d., and and his 8000 feet of cooking gas £1 13s. 4d.—or, together, £2 15s. Thus the prepayment consumer (still ignoring the excess price) pays, through his consumption being based on the lighting rate, 10s. more for his 12,000 feet than does the ordinary consumer. Would it not be better to charge him 4s. 7d. all round, which would bring in the same revenue, require less capital expenditure, less labour, less book-keeping, less meter reading, less collection, and less (among the slot consumers) discontent than would the differential system of charging for domestic requirements? There are comparatively few gas undertakings that adopt differential prices for ordinary domestic purposes; and for prepayment consumers especially, they are to be shunned. Mr. Enright had some encouraging experience to relate in connection with the competition of suction-gas plants; and his observations thereon are distinctly worth attention.

West Ham Amalgamation.

The final half-yearly meeting of the West Ham Gas Company has been held after a run of the undertaking for 64 years. At the end of this year, the concern joins its fortunes to those of the Gaslight and Coke Company. The West Ham business will pass over to the larger Company in a strong and vigorous condition, and will give the latter the opportunities they desire and require. Mr. J. Lister Godlee, the Chairman of the West Ham Company, in his new capacity as a Director of the Gaslight Company, has had an opportunity now of examining the position from both the sides of the hedge; and he is confirmed in his original view that the amalgamation is to the mutual advantage of both Companies, and to the consumers in both districts. Among the points of his address to the proprietors, he incidentally stated that the calorific power standard and test agreed between the London County Council and the Gaslight Company had been extended to the West Ham area. The valedictory meeting between the West Ham Company's Directors and proprietors is postponed to the end of December, when the former can give an account of their stewardship during the six months. It must be held then, as with the close of the month there will be no such entity as the West Ham Gas Company.

Traffic and Central Suspension.

In "Electric Supply Memoranda" last week, reference was made to the use of the large tower ladder in Cannon Street for work on the centrally suspended flame arc lamps, and the manner in which vehicular traffic was incommoded thereby. The matter would not have received any attention from us had not an electrical contemporary a short time since worked itself into a state of ebullition over the use of a tower ladder in Fleet Street for the cleaning of the bracket suspended high-pressure lights. Last Thursday at noon, the tower ladder in Cannon Street was again in operation. The electricity suppliers in the City have taken fresh fright at the report of the deputation to the Continent; and some of the flame arc lamps that were not long since suspended there have already been removed, and lamps of a new type have taken their place. It was the displacing of one of the old lamps and the erection of a new one that was again causing inconvenience at noon in Cannon Street on Thursday. There were a couple of men working at the top of the ladder; men protecting it at the foot; and another man hanging out of one of the windows of a neighbouring business establishment manipulating one of the wires attached to the premises. Officers' and men's time in taking down the old lamp and putting up the new, must have more than cut the so-called "profit" out of the £17 10s.—the quoted price per lamp per annum. Past the obstructing tower ladder, the traffic both ways was proceeding at walking pace.

Cautioning Shareholders.

The decision in the case of *Davies v. The Gaslight and Coke Company*, that a loosely worded section in an old Act of Parliament gives a holder of shares—no matter the smallness of his holding, no matter his motives—the right to inspect, free and obtain for a specified fee a copy of the list of shareholders and their addresses, has induced several Boards of Directors to repeat their warnings to shareholders to have nothing whatever to do with any new gas company until they have satisfied themselves beyond doubt that it is a creditable promotion. The Chairman of the South Metropolitan Company (Mr. Charles Carpenter), at the meeting of the proprietors last Wednesday, described the class of ventures he had in mind as "bubble" companies. A little crop of applications by debenture holders in the Law Courts recently, and the appointment of receivers and managers, tell their own tale, and show that "bubble" is not in this instance a misdirected term. Among other companies, the Croydon and the Wandsworth and Putney have attached slips (printed in red) to the half-yearly accounts distributed among the shareholders, cautioning them against the exaggerated prospectuses issued by insignificant gas undertakings.

Distinct Accounts.

In pursuance of the manifest policy of Parliament to have municipal trading concerns run on lines that shall not burden the consumer or user to the advantage of the ratepayer (*quâ* ratepayer), there are indications of an intention to assure that everything shall be kept above-board in connection with such concerns. In the Bury Corporation Bill, it was provided in respect of gas, electricity, and tramways, that all the interest on any principal moneys borrowed by the Corporation and applied by them for the purposes of these undertakings, and all other costs, charges, and expenses of and incidental thereto on revenue account shall be paid and satisfied out of the general fund; and all the rates, charges, damages, penalties, and other moneys received by, or for the benefit of, the Corporation on account of revenue in respect of these undertakings shall be paid and carried to the credit of that fund. It was further provided that the Corporation should keep as part of their accounts a separate account in regard to these several matters. The Local Legislation Committee have disapproved of the principle contained in these clauses, as they hold that every separate remunerative undertaking should be run distinctly and separately. The clauses have therefore been expunged from the Bill.

Presentations to Bolton Gas Officials.

The relinquishment by Mr. W. Smith of the position of Gas Engineer to the Bolton Corporation was recently made the occasion of the presentation to him of a testimonial by the employees. It took the form of a solid silver rose bowl, bearing the following inscription: "Presented to Mr. and Mrs. Smith by the workers at the Lum Street Gas-Works, the Meter Inspectors and Mains Department, on the occasion of their leaving Bolton, July 31, 1909." Mr. Smith, in acknowledging the gift and the good wishes accompanying it, said he had little to regret during his 23 years among the donors; and now that his time for rest had come, he was pleased that his son was to carry on the work in which he himself had laboured for so happy a period. At a gathering of about 200 workmen and their wives held at the Co-operative Hall, a presentation was made to the Superintendent at the Lum Street works (Mr. W. L. Heald), in celebration of his recent marriage. It consisted of a massive silver centre-piece, with side ornaments to match, and was filled with fruit and flowers. Both Mr. and Mrs. Heald expressed their thanks; the lady accompanying hers by the gift of a teapot to all the workmen's wives as a memento of the occasion. Mr. Heald will be leaving Bolton shortly to become Assistant-Manager at the Preston Gas-Works.

The Dellwik-Fleischer Process.—We have received from Messrs. R. & J. Dempster, Limited, of Manchester, an illustrated catalogue of the plant used in carrying out the Dellwik-Fleischer process for the manufacture of water gas. Views are given of installations in various gas-works, accompanied by particulars of working; and these are followed by a goodly list of places at home and abroad where the system is in operation.

Vertical Retorts for the Rochdale Gas-Works.—Last Wednesday, the Gas and Electricity Committee of the Rochdale Corporation received a report from the Works Sub-Committee in reference to the rebuilding and equipment of the old retort-house at the gas-works. The Chairman (Mr. Walker) and the Engineer and Manager (Mr. T. Banbury Ball), in accordance with instructions, have visited the gas-works at Derby, Coventry, Burnley, Wandsworth, Nine Elms, Kensal Green, St. Helens, and one or two works controlled by private companies, to inspect the different kinds of retorts in use. Mr. Walker and Mr. Ball reported to the Works Sub-Committee, who recommended the adoption of vertical in preference to inclined retorts. This recommendation the Committee confirmed, and directed that plans and specifications should be prepared for a new building. As some of the installations of vertical retorts are not in full operation, the deputation are to visit a few places again to see them when completed.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 473.)

BUSINESS on the Stock Exchange last week was not at high pressure; but it had brief moments of animation at times owing to special circumstances. Early in the week, apprehension was aroused by threatened complications abroad, arising out of the Chino-Japanese railway dispute and the Græco-Turkish difficulty. But these happily soon assumed a less belligerent form. Then there was some smart work in one or two speculative lines. This, however, had no spreading influence. The opening day was rather shy at the foreign alarms above noted, and Consols had a slight fall; but things were mostly inanimate. Tuesday was very quiet, except for the impending settlement. Consols were down again; but Railways brightened up in view of good returns and fine weather. On Wednesday, the general tendency was inclined to be flat all round, and there was little doing. On Thursday, the tone was quite the reverse; and everything, from Consols downward, made a recovery. Friday was doubtful, and movements were irregular; but Consols had another little advance, together with other of the gilt-edged division. Saturday was, of course, a quiet day; and again the choicest class of securities clearly had the best of it. Consols scored another $\frac{1}{16}$ rise. In the Money Market, there was an abundant supply, unaffected by Stock Exchange requirements; and all demands could be satisfied at easy rates. Terms for discount remained unchanged. Business in the Gas Market was of holiday proportions; and, had it not been for dealings in Gaslight ordinary and the several Argentine undertakings, the list would have been bare indeed. But everything was full of strength, and a large number of issues advanced their quotations. In Gaslight and Coke, the ordinary marked from 105⅛ to 106¾ *cum div.*, and 104 to 104¾ *ex div.*—a rise of 1⅛. The preference made 105½ and 106¼ *cum div.*, and the debenture 85⅞. South Metropolitan was little noticed at from 121½ free to 122½ *cum div.* and 120 *ex div.*—a rise of ⅝. The debenture made 85. In Commercials, the 4 per cent. changed hands at from 109⅞ to 110½; and the 3½ per cent. at 104⅝ and 105¼—a rise of 1 each. Among the Suburban and Provincial group, Brentford old was done at from 256 to 257, ditto debenture at 100½ and 101, Brighton original at 214 (a rise of 1), South Suburban at 119½ *ex div.* (a rise of ¾), and West Ham at 124½ *ex div.* (a rise of 1⅝). Many other advances were made without business being done; and they are noted in the list. The Continental companies were quiet. Imperial was unchanged at from 179 to 180, ditto debenture marked 97 *cum div.* and 95¼ and 95½ *ex div.*, and Union 96 free and 96½. Among the undertakings of the remoter world, Buenos Ayres was done at 13⅜ to 13⅛, Melbourne 4½ per cent. at 102½ (a rise of 1), Monte Video at 12⅜ to 12⅞, Oriental at 138½, Primitiva at 7 to 7⅛, and River Plate at 16¾ to 17.

ELECTRICITY SUPPLY MEMORANDA.

Improved Street Illumination—Visual Test v. Biassed "Expert"—"Telephone" System of Charging for Electricity—A "Seabrook" Statement—A Private Consumer's Experience—An Egotistical Council—Supremacy of the Isolated Plant.

THE Engineering Correspondent of the "Daily Telegraph" the other day had an article on "Improved Illumination." Generally, we find this particular Engineering Correspondent broad-minded and impartial; and there is nothing in the article before us against which any weighty objection can be brought to bear, excepting that some of the points advanced are impossible. The writer of the article, it seems, has been somewhat unfavourably impressed by the manner in which a local committee in a provincial town recently settled the form of lighting—whether gas or electricity is not stated—to be adopted in a certain street. According to him, visual comparison was the only test applied. His words imply that, in his opinion, this is a sad and crude method of illumination determination. The matter, in his view, should have been settled in a more scientific way; and an expert should have been employed—presumably in conjunction with an illumination photometer. The difficulty, however, is to get an expert in illumination who is really impartial. From a fairly considerable experience, we find that illumination experts have a predilection one way or the other; and that their advice invariably follows the same line as their partiality. Still, we do not know that there is much to be said against the visual test; seeing that the "Engineering Correspondent" of the "Telegraph" assures us, later in his article, that "the eye is a much more sensitive and automatic piece of apparatus than we generally realize." And if our friend had made a study of the results of illuminating tests by several illumination experts in the City of London, and seen in what a glorious mess were the results and conclusions of these experts (who used various illuminating photometers on their nocturnal visits to the City), there is a fair amount of certainty that he would straightway give a preferential vote for the tests made by that "sensitive and automatic piece of apparatus," the eye. Street illumination is for the convenience of the eye; and it would be a queer state of things, therefore, if a majority of the eyes of a Committee could not judge of the lighting which pleases them best—much better than an illumination photometer read by a single expert, with probably a jaundiced eye. An illumination photometer cannot gauge the general effect of the lighting. Moreover, street illumination is not a thing that needs to be weighed out and measured with the exactitude of radium. The most useful effect for situation, as judged by the "sensitive apparatus" for the use of which the illumination is provided, is what is required.

Let us make clear to the writer of the article that we are not by any means the opponents of scientific accuracy—in its proper place; but there is nothing accurate, in point of uniformity, about the conditions of a street, and there is no consistence in the atmospherical conditions in which lights for street purposes are employed. Therefore, no matter how stringent and exacting the conditions in making a test in any particular place, or under any particular atmospheric state, the results would not apply to any other conditions that were dissimilar. We will go so far as to say that, however precise the process of testing that an expert may apply to the lights in a street, there will be nothing sufficiently definite about it all to serve as a common guide or standard; and to get definite conclusions by trial lighting in regard to every street and place would mean a considerable expenditure. We want more commonsense, less finical procedure, and more disinterestedness applied to this street-lighting question. Surely a committee of intelligent men, each with such "sensitive and automatic pieces of apparatus" as a pair of eyes, can judge as to the best light for the purpose under some of the worst of atmospheric conditions; surely, too, a committee of intelligent business men can judge as to the expense of improved illumination, from capital cost of installation to annual expense and renewal, when plain, inclusive figures are put before them, respectively by the gas or electricity undertakings. There is no necessity for them to be confused more than they are at present by the views of experts who are not impartial. Of course, if they can find an expert who is unmistakably impartial and free from duplicity, then by all means—if the local councillors cannot trust their own eyes as to the intrinsic value of the lights offered, if they cannot trust their own commonsense, if they cannot trust their own reading of costs—engage that spotless expert, and grant us the pleasure of an introduction to him.

With characteristic activity and ability, Mr. A. H. Seabrook is already impressing the Marylebone Borough Council with his skill in the commercial management of an electric lighting undertaking. His transfer from West Ham is quite of recent date; and he has since then been engaged in setting, according to his judgment, the Marylebone electricity undertaking in order, and by so doing, showing that he is not altogether in agreement with the conditions under which the business was worked by his predecessor. The Marylebone Electricity Committee have so much confidence in him that they are letting him have plenty of rein. Among his fresh introductions is a new tariff of charges—new for Marylebone; but it has come out with such a flourish of trumpets that the good councillors of Marylebone are no doubt persuaded that there is in it something genuinely novel. The same principle in the matter of tariffs has been applied elsewhere, though perhaps on a less extensive scale; and the only point that might seem novel and clever about it (if it were not known that someone else has previously used the expression) is that to the portion of the tariff applying to what are called "small" consumers for lighting only, Mr. Seabrook has utilized the term the "telephone system of charging." The term carries its own explanation; and it is thought that it will assist to ready comprehension, and bring in a good deal of custom. We are afraid, however, that it will not appeal to those people—they are the great majority—who have not been induced by the latest system of telephone charging to adopt a telephone.

The new tariff is merely the prepayment of a fixed sum per annum, based on the consumers' maximum demand, with 1d. per unit afterwards, no matter the purpose for which the electricity is used. The tariff starts with "large" consumers—the scale running from 200 kilowatts down to 50 kilowatts. The consumer whose maximum demand is 200 kilowatts will pay a fixed charge per annum of £900; the consumer whose maximum requirement is 50 kilowatts will pay a fixed charge per annum of £350—in all cases, be it repeated, with a charge of 1d. per unit afterwards. The conditions for this class of consumer are a ten years' contract, and exclusive use of electricity for lighting and power; the kilowatt charge being payable in advance. We are not altogether sure that the Council can enforce that condition as to "exclusive use." Coming to the medium sized consumers, the scale ranges between 45 kilowatts and 20 kilowatts; the fixed annual charge for the 45 kilowatt user being £337 10s., and for the 20 kilowatt man £180. Excepting that the contract is reduced to five years, the conditions are the same as for the "large" consumers. Then come the "small" consumers for lighting; and the jocular Mr. Seabrook includes in this category the 18 kilowatt consumer (who will have to pay a fixed annual charge of no less than £166 10s. per annum), and at the bottom of the long scale is the consumer with a maximum demand of only $\frac{1}{10}$ kilowatt, who will be called upon to pay a fixed charge of £1 8s. a year. A large proportion of the small consumers will probably have a maximum demand of 1 kilowatt and under. A consumer with a maximum demand of 1¾ kilowatts will pay a fixed annual charge of £24 10s.; of 1 kilowatt, £14; of ¾ kilowatt, £10 10s.; of ½ kilowatt, £7; of ¼ kilowatt, £3 10s.; of $\frac{1}{10}$ kilowatt, £1 8s. The advantages of this system of charging (which will necessitate a fair amount of supervision and inspection) will, it is

thought, be that for all purposes the excess charge will be 1d. per unit, and that only one set of wiring and one meter, notwithstanding diversity of use, will be necessary. The great disadvantage will be the lump sum down, before the "goods" are supplied; and the antipathy of the Britisher to pay for what he does not have or actually consume.

For "heating, cooking, and other uses of electricity," excluding lighting and motors, the fixed charges will range from 5s. a year for ¼ kilowatt maximum demand up to £2 2s. for 5 kilowatts, with 1d. per unit additional. But these terms for cooking and heating are only to be enjoyed where "the light of the premises is *exclusively* by electricity from the Council's mains." Mr. Seabrook is satisfied that with this system of charging, in the matter of cooking and heating, he can compete with gas. It would be interesting to know what has satisfied him on this point. It is to be hoped the paper on which his calculations have been made has not been lost in a "Spring clean." If it has not, perhaps he will be good enough to show us what has convinced him. It is one thing to make a statement; it is quite another thing to prove it. Take a four-lamp radiator for which, under the tariff, the fixed charge would be £1 per annum. Supposing a cold season, when that four-lamp radiator might be required in a room 14 hours a day. This would mean 1s. 2d. for a day's electrical heating (and the room then would have to be a boxlike structure, of restricted dimensions, with a low maximum demand for heat), *plus* the proportion of the annual £1. At this rate, it would only require about seventeen days' use of this radiator to run away with £1 worth of electricity, excluding the proportion of the maximum demand charge. About 7500 cubic feet of gas are purchasable in Marylebone for £1; and taking seventeen cold days such as we have imagined, Mr. Seabrook has to show that a gas-fire radiating heat equivalent to the four-lamp electric radiator would consume 441 cubic feet in a day of fourteen hours, to justify the assertion that, on his tariff, electric heating can compete with gas. We wonder if the members of the Marylebone Borough Council do sincerely believe this statement of their new Electrical Engineer, or whether, in approving the report, they simply winked at the audacity of the statement of the new man at the helm. With a deficiency on the undertaking of close on £4000 in the past year, the Marylebone Borough Council naturally want the business hustled up.

Talking of radiators, we have just been examining the gas and electricity accounts of a private consumer who is threatened with a change of electrical meter for lighting. He has only half-a-dozen 32-candle power metallic filament lamps; and his account for the current for these, including meter-rent, worked out last Lady-day quarter to 18s. 6d. His gas account, which includes the lighting of all the rest of the house and a cooking-stove, receded by 6s., as compared with the corresponding quarter of 1908, which recession would about represent the incandescent gas-lamps displaced. The electrical people now tell this consumer that his lighting meter is slow; and that it will have to be changed. The same consumer has had on trial a four-lamp radiator. At the end of the Lady-day quarter, the account for current for this radiator, which was in intermittent use in a bedroom, was £2 16s. 6d., exclusive of the meter and radiator rent. There has been no suggestion that this meter was fast. The radiator has been voted a failure by the user, both on account of the economy of heat and the heaviness of the price paid for it; and the lighting meter is to be changed by the electricity suppliers. The result, however, is that the total payments for gas and electricity in the Lady-day quarter worked out to £3 12s. more than (for gas only) in the corresponding quarter of 1908, the only addition being—regarding the incandescent gas-lights displaced as being equal to the half-dozen 32-candle Osrams installed—the radiator. The consumer is not pleased with his experiment.

The Finchley Borough Council are, as will have been seen by a news paragraph in the "JOURNAL" last week, on their hind legs over what they unquestionably consider to be a gross piece of impertinence on the part of the Local Government Board. The Council have been seeking the sanction of the Board to a loan of £2200 for electric arc lighting in the streets; and the Board have ventured to ask the Borough Council whether they have carefully considered the relative cost of electric and gas lighting, and have requested copies of the reports of the Highways and Lighting Committee on the subject. This seems a modest enough inquiry and demand; but, in reply, the Council have as good as told the Board to mind their own business—overlooking the fact that it is the business of the Board to inquire into the whole subject to see whether or not they shall give their sanction to a loan, and that it is not the duty of the Board that they should half do the work entrusted to them by Parliament. It is only through the Board that ratepayers can get any proper protection against a spendthrift Council. The Council consider they are the best [*sic*] judges—comparing themselves with the Board—as to which illuminant should be used in the streets. The Board have had a somewhat extensive experience in this matter all over the country; and Finchley is not the whole country. But the Finchley Council "do not feel that they can submit to any outside pressure to force upon them an illuminant of which they do not approve, and which they consider for the present purpose is not so satisfactory as the one they propose." They also "respectfully" submit that "the point which the Board are called upon to decide is whether a loan should be granted for the necessary sum to enable arc lighting to be installed, and not as to whether gas or electricity should be used." The Council fail to see that the inquiry of the Board is pertinent to the consideration and decision of the question as to whether the loan shall be granted. The letter, however, indicates bias and egotism, and that, in the interests of the ratepayers, the Council are not wisely administering the public lighting service. It is interesting to know that the Finchley authority believe themselves to be better judges of the duties of the Board than the Board themselves.

It was intended that the Manchester Electrical Exhibition should work wonders for electricity suppliers among the cotton mills; but intention and achievement are on altogether two different planes—that of achievement being much lower than that of intention. Just lately the electricity suppliers have been not a little staggered to find the degree of knowledge of the mill owners on the subject of the low cost at which they can generate electrical energy. It came as a blow to some of them to hear from their very midst, at the meeting of the Incorporated Municipal Electrical Association, Alderman Higham, who is an Accrington cotton spinner, stating that at his mill, with his isolated plant, he can produce electricity at 0·34d. per unit. Corroborative figures have been coming forward; and now "Meteor" of the "Electrical Times" appears to be thoroughly convinced there is no idle boast about this, for he says "there is evidently not much cream to be skimmed from the cotton-mills by the power companies." There is a greater chance for gas-engine driven generating plants; and this after all that has been written and said on the subject of the concentration on the large scale of generating plant! Times change, and opinions with the times.

INSTITUTION OF CIVIL ENGINEERS.

Questions of Reform.

SOME time ago in the "JOURNAL," we referred to a Committee formed among the members of the Institution of Civil Engineers, who, unofficially, were directing attention to certain matters in which they thought there was room for improvement in the work of the Institution, and upon which they sought the opinion of members. The Hon. Secretary of the Committee, Mr. A. S. E. Ackermann, has now circulated the results of the voting upon these questions of reform, and correspondence that has passed between the Committee and the Council of the Institution.

In all, 2342 voting papers have been received, and the analysis of 2193 of them is given in schedule form. Upon the question of a re-organization in the constitution of the governing body of the Institution (such as the establishment of Sub-Committees and all classes of members being represented on the Council) there voted 1640, of which there was an affirmative percentage of 72; or if those who were neutral are added, this percentage becomes 91. As to there being regulations for professional conduct and a scale of minimum remuneration, 2085 votes were given, of which 81 per cent. were in the affirmative. For the Institution entering more prominently into research work, 2013 votes were cast, 65 per cent. being affirmative; and about the same number (2085) voted on the question of a system of assisting members and students to obtain appointments. Of these 2085 votes, 86 per cent. were in favour of it. Out of 2063 voters 72 per cent. thought greater prominence should be given to practical experience in the present system of examinations. The total votes on all the eight points submitted reached 13,417, of which 76 per cent. were in the affirmative, or adding the neutrals, this became 91 per cent.

These voting results were communicated to the President and Council in a covering letter of April 5 last; but, after some delay, the only reply from Dr. Tudsbery, the Secretary of the Institution, is under date of June 22, wherein he writes "the Council now instruct me to say that they do not find they have any observations to make on the letter of the 5th of April." Such a result is by no means surprising; but it must be a satisfaction to the members' Committee to find that so many have troubled to return their voting papers and to ascertain that such a large percentage of the voters is in favour of some degree of modification and reform. The Committee's circular letter of July concludes thus: "It is not, however, the intention of the Committee to withdraw from the work which they have taken in hand; and from time to time questions which appear to materially affect the welfare of the Institution will be submitted to the Council for their due consideration."

Determining the Temperature of a Coal Heap.—According to the "Scientific American," the old method of determining the temperature of a heap of coal, by driving pipes and hanging thermometers in them, has been greatly improved by means of a special coal auger, similar in form to that used in mines, but provided with a means of inserting a small maximum thermometer near the point. Extensions 4 feet in length, for convenience in carrying, may be attached to the auger, so that the thermometer can be readily inserted into any depth in a pile. The point of the auger can be driven 20 feet in three to five minutes. About ten minutes are required for the thermometer to attain the temperature of the surrounding coal. Temperatures taken in this manner are much more accurate than those obtained by hanging a thermometer down a pipe, where there is more or less circulation of air, making it impossible to locate the hottest spot. Temperatures obtained by means of the auger have been found to be 40° Fahr. higher than by the pipe method.

PERSONAL.

THE NEW ENGINEER AT NEWCASTLE.

We are pleased to learn that the Directors of the Newcastle and Gateshead Gas Company, at a meeting held last Tuesday, appointed Mr. Thomas Hardie, the Manager of the Redheugh works, Chief Engineer of the Company, in succession to Mr. W. Doig Gibb, who, as is now generally known, is coming to London to take up the duties of Chief Engineer of the South Metropolitan Gas Company. Mr. Hardie's training has specially fitted him for the position he is to occupy. In June, 1890, he was admitted an Associate of Physical Science of the University of Durham; the subjects taken at the examination being chemistry and physics. From the next month till February, 1894, he served a term of apprenticeship with Messrs. John Abbot and Co., Limited, of Gateshead; passing through their several shops and drawing office. In February, 1894, he was appointed Assistant to his brother, Mr. William Hardie, the Engineer of the Tynemouth Gas Company, and the present Mayor of the borough; but he relinquished the position in April, 1896, to take up the duties of Assistant-Manager at the Redheugh works, of which he became Manager in July, 1899. Since he has been at Redheugh, he has superintended the erection of plant capable of producing 7 million cubic feet of coal gas per day, and carburetted water-gas plant equal to the daily production of 1¾ millions. He has designed a large portion of the plant necessary for these extensions, besides making all the alterations required for several installations of stoking and coke-handling machinery, designing buildings, and arranging the plant needed for the production of 10 tons of sulphate of ammonia per day. Mr. Hardie will be succeeded at Redheugh by Mr. Norman Reid, who was a pupil of Mr. Gibb, and who (on the completion of his articles) remained with him as Assistant. About three years ago, he was appointed Chemist at the Redheugh works, and still holds this position.

The elected new Chief Engineer of the South Metropolitan Gas Company (Mr. W. Doig Gibb) was present at the meeting of the proprietors last Wednesday, as an interested spectator. The references to him by the Chairman (Mr. Charles Carpenter) were well received by the proprietors, who will welcome the new chief on the next occasion in the seat that was formerly occupied by the Chairman. Mr. Gibb, we believe, will take up his duties at the commencement of October.

SO-CALLED INTERNATIONAL UNIT OF LIGHT.

By Dr. H. Krüss, of Hamburg.

[Abstract Translation of a Communication to the "Journal für Gasbeleuchtung" of Aug. 14.]

The Bureau of Standards at Washington has published a statement, dated May 20, 1909, announcing an agreement at which it has arrived with the English National Physical Laboratory and the French Laboratoire Central d'Electricité in regard to an international unit of light. It is noteworthy that the German authorities have not co-operated therein. The communication states that the unit of light accepted in Germany is the light of the Hefner lamp, as certified by the Reichsanstalt, at an atmospheric pressure of 760 mm. and with an atmospheric humidity of 8·8 litres of aqueous vapour per cubic metre of air. The unit of the National Physical Laboratory is the light of the 10-candle pentane lamp at an atmospheric pressure of 760 mm. and with 8 litres of aqueous vapour per cubic metre of air.

It should here be pointed out that a humidity of 10 litres was formerly adopted by the National Physical Laboratory, and that it was with this found and settled at the International Photometric Congress at Zürich in 1907 that the 10-candle lamp was equal in light to 10·95 Hefners. Now it is proposed to change in England to 8 litres of moisture, on the ground that, owing to a false method of measurement having been used formerly, values too great by 2 litres have been constantly obtained. At 8 litres, the pentane lamp has a rather different value, as its light is then equal to 11·11 Hefners. The Bureau of Standards goes on to point out that the unit of light of the Laboratoire Central at Paris is the bougie decimale, which is one-twentieth part of the platinum unit adopted by the International Congress of Electricians at Geneva in 1884. According to Violle's researches, the platinum unit is equal to 2·08 carcels; and as the Zürich congress in 1907 decided that the carcel was equal to 10·75 Hefners, it follows that the bougie decimale is equal to 1·12 Hefners. This result, however, depends on the none too satisfactory determination of the value of the platinum unit in terms of the carcel by Violle, and on the conversion of the dubious carcel into terms of the Hefner. The unit of the Bureau of Standards, however, has been maintained through a series of carefully arranged electric glow lamps, which have been proved by numerous comparisons with the unit of the Reichsanstalt to have a value of 1·14 Hefners. In order to come into agreement with the pentane unit and the bougie decimale, the Bureau of Standards has decided to reduce the value of its glow lamp unit by 1·6 per cent., so that it will be equal to 1·12 Hefners. This unit, to be termed the "International Candle," would be equivalent to 1 pentane candle, or 1 bougie décimale, or 1 American candle, or 1·11 Hefners, or 0·104 carcel.

These conclusions must strike scientifically minded people with amazement. For a physical unit, it is essential that it should have an explicit definition and be absolutely reproducible, which implies that it is controlled absolutely by measure and weight. This is not the case with the proposed unit, which is deduced from three different units, all of which rest on uncertain bases, and two of which have been brought to the value now adopted by artificial changes. The pentane lamp is certainly the best of the three. But it also has been subjected to variations; and pentane, which is its fuel, is not a material of exactly definable chemical composition, but a mixture of different isomers. Hence samples of different origin may not agree the one with the other. Nevertheless, the Bureau of Standards has announced that from July 1, 1909, it will use the new unit exclusively, and expresses the hope that the Reichsanstalt will from time to time ascertain the ratio of the Hefner to the new unit. It is then very sensibly pointed out that a difference should be drawn between a unit and a standard. The unit can be maintained, even though the standards may be replaced from time to time by better ones. The Hefner lamp may remain the most convenient and exact standard; and it may be anticipated that, by continued careful comparisons between the Hefner lamp and the electric glow lamps the Bureau of Standards will use as sources of light for comparisons, the new unit might be maintained exact within 0·1 to 0·2 per cent.

This movement concerns both electrical and gas circles in America, England, and France; and through the International Electro-Technical Commission at London and the Société Technique de l'Industrie du Gaz advances have been made to German technical men to give it their approval. The German Technical Associations concerned therefore joined in a conference with representatives of the Reichsanstalt on April 23 last; and the following conclusions were unanimously agreed to:—

1.—There is at present no unit of light conforming to all requirements.
2.—It is desirable that an international unit of light should be established.
3.—This unit must be defined in one single manner only.
4.—The unit must be susceptible of exact production at any time by following a description.
5.—Of the units referred to in the proposal of the British Committee, the Hefner lamp best fulfils the last-named condition.
6.—The proposal does not conform with the condition that the unit must be definable in a single manner, because the proposed unit depends on five different standards. It is not therefore acceptable in its present form, as it is to be feared that it would only introduce inexactness and error into the domain of units of light.
7.—The question of the international unit of light should therefore be left for further joint consideration by the national laboratories of the different countries.
8.—At present, the following values may be used for conversions—viz., 1 pentane candle = 1·11 Hefners; 1 carcel = 10·75 Hefners, and 1 American candle = 1·11 Hefners.
9.—For the practical unification of measurements of light, it is essential that, in addition to the same unit of light, the metric units should be adopted internationally in all photometry.

In regard to the last point, it may be pointed out that in England measurements of illumination are stated not in "lux" or metre-candles, but in candle-feet, which renders comparisons extremely difficult. In the gas industry, also, the introduction of an international unit of light would not generally lead to the results being comparable, because the methods of measuring and of stating results in terms of the consumption of gas per carcel, or of candles per 5 cubic feet, would still remain insusceptible of exact comparison or conversion.

Mr. Montagu Somes Pilcher, for many years one of the Auditors of the Imperial Continental Gas Association, and who died last March, left estate of the gross value of £77,152, with net personalty £67,594.

At the last meeting of the Neath Town Council, a sum of £100 was voted to Mr. R. A. Browning, the Gas Engineer and Manager, for extra services rendered in connection with extensions at the gas-works during the past few years.

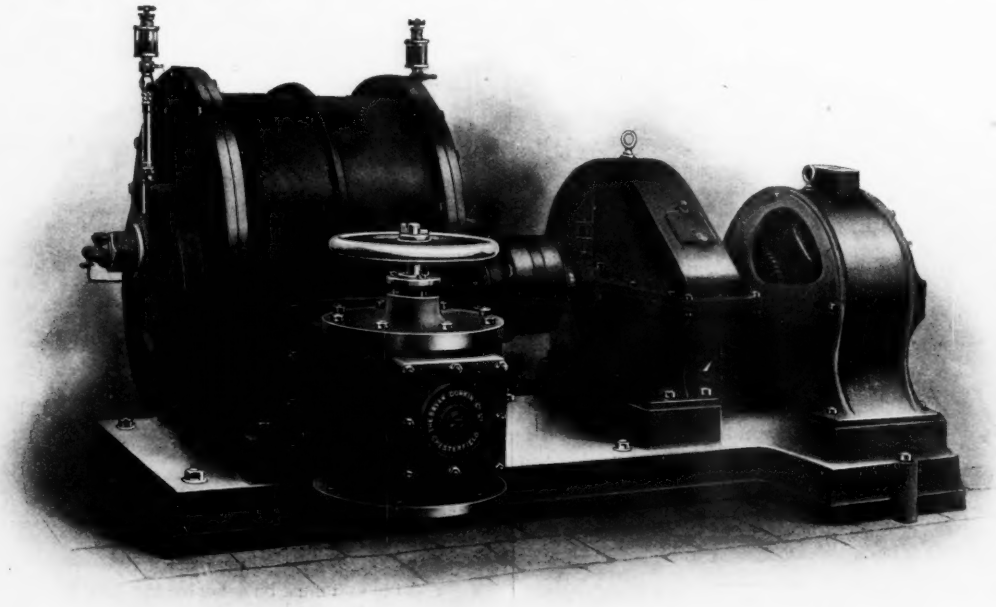
Experiments on a large scale on the underflow or sub-surface flow of water through saturated sand or gravel are being made by the United States Reclamation Service in the Arkansas Valley, Western Kansas. After a search and tests to find a supposedly heavy underflow, a row of wells was sunk across a valley near Deerfield, and pumps were erected there. A "Press Bulletin" issued by the Service states that the wells and pumps lowered the water plane 19 or 20 feet below the river level; also that during the latter part of 1908 the wells began to weaken materially. By April, 1909, the gravels had become filled again on the north side of the river; but in the valley on the south side the "underflow" was not sufficient to restore the amount pumped the preceding year. Experience shows that the so-called "underflow" is not a very reliable source of water supply on a large scale.

ELECTRICALLY-DRIVEN GAS-EXHAUSTERS.

In many quarters attention has of late been given to the driving of gas-exhausters by electric motors; and a recently-issued catalogue of plant manufactured by the Bryan Donkin Company, Limited, of Chesterfield, contains an illustration (which we here reproduce) of an exhauster and motor mounted on one cast-iron underbed—designed for use in gas-works where the power is distributed electrically. Regulation can be effected by means of automatic electrical regulators of the Company's design, in which the speed of the motor is varied so that the vacuum is kept constant. In this way bye-passing can be done away with; and wear and tear of the plant is kept at a minimum.

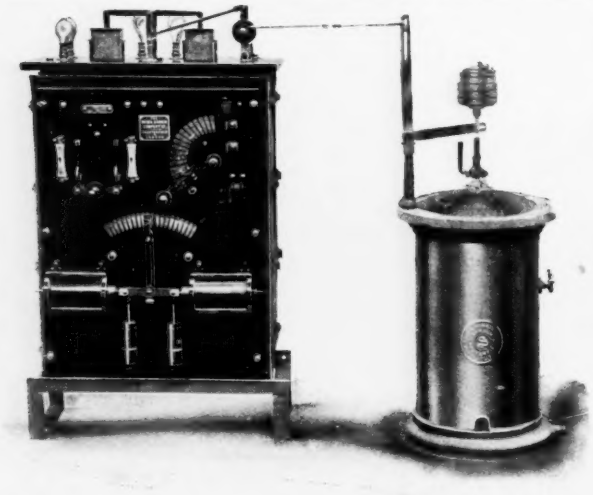
Writing on the subject, the Company point out that "exhausters driven by electric motors are being put down to a much larger extent than formerly; and it is highly probable that, in future, new large gas-works will have their own electric-power stations and drive all their auxiliary machinery by means of electric motors." In the motor-drive to an exhauster shown, the motor is geared to the exhauster through double helical machine-cut gear running in oil. The Bryan Donkin Company have had considerable experience in arranging electrically-driven plants—some being mounted as shown in the photograph; others have been arranged with worm reduction gear; while others, again, have two sets of double helical gear in a gear-box. In this case, the motor and exhauster shafts are exactly in line with one another.

These motor-driven exhausters are arranged with different methods of control. The majority are put down to run at one speed only; the motor being started by the usual main-switch



Standard Electrically-Driven Gas-Exhauster.

and starting-switch. Any surplus gas is taken care of by the bye-pass. In other cases, the speed of the motor is varied by resistances either in the shunt or the armature circuit; and in some instances by a compound rheostat, controlling both currents. These switches are operated by hand. If it is desired, however, to make the control automatic, the equipment shown in the smaller engraving is suitable. This consists of a Bryan-Donkin



Control Equipment for an Electrically-Driven Gas-Exhauster.

hydraulic regulator similar to those in use with their steam sets, but slightly modified to suit the special conditions. This is coupled by means of the horizontal rod to a two-way oil-break switch, which controls the solenoid operated regulator on the front panel. This front panel also contains a double-pole main-switch and fuses, and a starter with "no-voltage" and "overload" releases.

The method of operating is as follows: The horizontal coupling rod is lifted off the oil-break switch-handle, and the plant run up to speed by the starter. The oil-break switch is then operated by hand until the desired vacuum in the inlet of the exhauster is attained. This will have brought the bell of the hydraulic regulator to its central position. The coupling rod is then connected to the oil-break switch; and as the bell moves up or down with slight variations in the vacuum, the oil-break switch will be moved to make contact either at one side or the other. This will cause either one or the other of the solenoids to be energized, and the regulator switch to be moved accordingly. As the vacuum increases, the speed will be reduced *vice versâ*.

The "Annuaire Durand" of Gas and Electricity.—We have received from Madame Paul Durand, the owner and general manager of our contemporary "Le Gaz," the "Annuaire Général des Industries de l'Eclairage, du Chauffage, et de la Force Motrice par le Gaz et l'Electricité" for the current year. This directory, which is known to those of our readers who are in any way interested in Continental gas undertakings, was first published in the year 1874 by M. Paul Durand, who devoted a great deal of personal attention to it up to the time of his death about six years ago. It was then continued under the supervision of his widow, who has now entrusted the editorship to M. Maurice Lelièvre. As the present is the thirty-fifth year of issue, the general contents of the book need only be briefly indicated. The gas section is divided into five parts, giving lists of the towns lighted by gas, gas lighting and heating companies, makers of gas plant and appliances, and French patents issued. The section devoted to electricity furnishes similar information on this subject. Lists of technical publications, of the plans constituting the volumes of the "Constructeur d'Usines à Gaz," and of books bearing upon the two industries concerned, are given; and the concluding chapter contains the practical instructions in photometry prepared by MM. Dumas et Regnault in 1860. It will thus be seen that the contents of the book are of a varied and useful character; and the Editor has endeavoured to place the "Annuaire" at the very head of similar works for the completeness and accuracy of the information it furnishes. The matter is so arranged as to be easily referred to; and there is a useful index. It is published by Madame Durand, at No. 12, Rue Fontaine, Paris (IX.), at the price of 3 frs. 10c. post free to places abroad.

ELECTRIC SUSPENSION RAILWAY FOR COAL TRANSPORT.

An interesting example of an electrical suspension railway is the one recently constructed by Messrs. Adolf Bleichert and Co., of Leipzig, for the Hamburger Freihafen-Lagerhaus-Gesellschaft.

The fact that the coal stores are located in the cellars on the street side (away from the River Fleth, where the barges arrive), and that the openings for shooting in the coal are also on the side-walk on the Bandtor Quay, precluded the idea of cartage, as such an arrangement would seriously disturb the traffic of what is a very busy street. It was, therefore, necessary to arrange for aërial transportation; and the conditions favoured the adoption of an electric suspension railway—a system which in several other respects may also be considered of high efficiency. The track consists of an I-iron running rail carried on wrought-iron trestle framework stretching for a certain distance over the water, as shown in the second photograph. It then crosses over a bridge, takes a sharp curve round the corner of the accumulator house (see photograph No. 1), and is carried the length of the street on strong masts anchored to the masonry work of the boiler-house. The iron construction has been made to harmonize with the architectural features of the building. A bare trolley wire runs alongside the rail, from which the car receives current through a spring-loop.

The working is very simple, as all the movements are controlled from any fixed point. By means of a few simple manipulations, the workman stationed on the Fleth steps lowers the car over the barge, where a full bucket is waiting to be exchanged for the empty one. On switching-on the current again, the car rises to its highest position and stops automatically. On again switching-on, the car commences its trip, is weighed while travelling (by a "Schenck" weighing appliance), and finally arrives in front of the boiler-house. A workman stationed here lowers the bucket over one of the discharge holes, tips it, and returns it to the shore.

A special advantage of the method selected by the Hamburger Freihafen-Lagerhaus-Gesellschaft is the fact that no re-handling of the coal is necessary during the transport, with the result that it suffers no damage from falling, whereas with the methods of conveying bands and elevators which were previously employed, a very complicated system would have been required, with re-handling several times.

Suspension Rail over Street.

Unloading Coal Barges.

FIRE LOSSES THROUGH GAS AND ELECTRICITY.

Our brisk little American contemporary "Acetylene Journal" has been in the habit of giving from time to time statistics of the fatalities and fire-losses caused through different illuminants in the United States. It has made arrangements for securing reports of, as far as possible, all accidents due to illuminating agents; and it gives brief details of those in which fatalities occurred, and a summary of the losses through fire consequent on accidents of this class. As the object of the compilation is to demonstrate the safety of acetylene relatively to other illuminants, and to petroleum in particular, no bias towards town gas or electricity can be alleged. In regard to town gas, however, it should be remembered that about 90 per cent. of the gas supplied in the United States is carburetted water gas, which is a far more potent asphyxiating agent than the coal gas which, according to the latest Board of Trade returns, forms over 89 per cent. of the gas supplied by authorized gas undertakings in this country. Hence it is not surprising to find the fatalities due to town gas in the American statistics high, and that the greater number of them are ascribed to asphyxiation.

The latest summary published refers to the months of April and May last. There are 168 fatalities reported, of which 90 were caused by gasoline and kerosene, 50 by town gas (43 being cases of "asphyxiation"), 27 by electricity, and one by acetylene. The losses by fire during the same period amounted to: From gasoline and kerosene, £126,360; from town gas, £49,220; and from electricity, £144,000. Acetylene is given a clean record in respect of fire losses, perhaps because the statistics do not include any losses of less than £200 per fire. The point to which attention should especially be given is that the damage to property caused by fires due to electricity was three times as great as that resulting from fires due to town gas, and even exceeded that caused by kerosene and gasoline fires. It cannot be argued that the period in question was a particularly unfavourable one for electricity in this respect, for on turning back to the statistics next before those quoted which have been published by the "Acetylene Journal," we find losses by fire in one month aggregating: From gasoline and kerosene, £97,860; from town gas, £30,400; from electricity, £110,800; from acetylene, £6800. That is to say, electricity did over 3½ times as much damage by fire as did town gas. The import of these figures as to the agent which should be adopted for the lighting of valuable premises is obvious.

Export of Monazite Sand from Bahia.—According to the British Consular report on the trade of Bahia, which has just been issued by the Foreign Office, the export of monazite sand during 1908 amounted to upwards of 2000 metric tons; being considerably in excess of the export during the preceding three years. All the monazite sand exported from Bahia is derived from a certain stretch of sea beach in the southern part of the State. The quantity to be found in the deposit varies considerably from time to time; and the collecting of the sand is largely dependent upon weather conditions. The following figures show the export of sand from Bahia during the past five years: 1904, 2901 tons; 1905, 1039 tons; 1906, 945 tons; 1907, 1741 tons; 1908, 2114 tons.

Spontaneous Heating of Coal.—In a paper read before the Birmingham Section of the Society of Chemical Industry early in the year, and given in the July number of the Society's "Journal," Mr. Richard Threlfall, F.R.S., sets out some of the results obtained by the chief investigators of this subject. Fayol's conclusion is quoted, that "there is a direct relation between the liability to spontaneous heating and the height and volume of the heap in which it occurs. If the heap is small, the temperature rises to a certain point, after which it becomes stationary, and then falls again." The New South Wales Commission verified for themselves a similar piece of evidence in regard to the influence of the depth of the heap. The Engineer of the Australian Gaslight Company, of Sydney (Mr. T. J. Bush), drew the attention of the Commission to a fact he had noticed in connection with the coal-stores belonging to his Company. In one of these stores the coal was never more than 14 ft. 6 in. deep, whereas in the other it was 20 feet deep. The coal in both stores was exactly the same. The heap 14 ft. 6 in. deep never fired; but the other heap was always hot, and generally on fire at one or more points.

NOTES FROM WESTMINSTER.

For the most part the Committee lobbies are now deserted; and the work of inquiring into Private Bills is drawing to an end. Though there has not been much cream to be collected at Westminster this session, no one was particularly sorry to be relieved from attendance in the Committee rooms under the torrid conditions prevailing last week.

Coatbridge Gas. The Confirmation Bill containing the Coatbridge Gas Order was under consideration by a House of Commons Committee on Tuesday and Wednesday. The inordinate appetites of the Town Council for advantages from the Gas Company, together with the seductive advice of Counsel, brought them to Westminster once again; and their gains will not compensate the borough for the delegates' fares and hotel expenses, let alone the fees of Counsel and of experts. They altogether over-reached themselves. The Company have been well managed; and the only things the Council could lay to their charge were two or three past financial errors which the Company were quite ready to rectify. Then the Council wanted, in consideration of the reduction of the standard illuminating power from 20 to 15 candles, to knock something more off the standard price of 2s. 6d., though the Board of Trade had already removed the neutral zone, between 2s. 6d. and 2s. 11d. But with the increase in the price of material for producing 20-candle gas, the Company need some assistance; and this can be given them through the reduction of illuminating power without injuring anyone who uses gas in ways that are not obsolete. "The rock upon which the whole of the financial arrangements of the Company are founded," said Mr. Honoratus Lloyd, K.C., in a burst of eloquence, is the standard price of 2s. 6d. Investors in the Company at the present time are only getting an average return of 4·58 per cent. These considerations are sufficient to show the unreasonableness of the Council's request, and were quite sufficient for the Committee. The Council also wanted a calorific power test in addition to the illuminating power one. It was scornfully described by Mr. Corbet Woodall as "simply silly," and by Mr. Thomas Wilson, the Company's Engineer and Manager, as "a farce," to suggest its application to a small Company like the Coatbridge before the matter is more fully investigated and understood. They are not wrong; and it would have been simply silly of Parliament to have complied, and to have imposed a dual test. In this matter, Parliament has not shown any disposition to deserve the application of the contemptuous description; and it is hoped they never well. One standard of quality has been found sufficient for the past; and it will do for the future. When the major part of gas consumed was for lighting purposes and the minor part for heating, an illuminating power standard was sufficient. Now that the major part of gas is used for purposes in which its heating property is of moment, and a very minor part for purposes in which luminosity is required, one standard is still sufficient, and that one in due season will assuredly be that of calorific power.

A GERMAN TEXT-BOOK OF HYGIENE.*

We have received two sections of the handbook on hygiene, which has been compiled by Professor Prausnitz, the Principal of the Hygienic Institute of the University of Gratz, with the assistance of a number of collaborateurs. The handbook itself constitutes the eighth volume of Lehmann's Medical Cyclopædia, of which the earlier volumes are devoted to more purely medical subjects. The volume on hygiene consists in all of 24 sections, of which only the two now before us seem to treat of matters directly falling within the purview of the "Journal."

The first of these two sections, being the ninth section of the volume, deals with ventilation, heating, baths, and steam laundries. It is written by Herr H. Recknagel, an engineer of Munich, and comprises 60 quarto pages, with about 60 illustrations. The subject of ventilation is treated in a satisfactory manner, except that it is divorced from the treatment of lighting and heating. As, however, methods of heating and ventilating must be somewhat different in Continental countries where great extremes of heat and cold are more commonly experienced than in England, it is not fair to press this point against the author's judgment. Here we are able fortunately to depend very largely on our lighting and heating arrangements for the efficient ventilation, incidentally, of closed rooms. The subject of heating is handled very well in so far as steam and hot-water supplies to buildings are concerned, but the use of gas-fires is passed over in a few lines of which a large proportion refer to risks of fire and explosion which are known by world-wide and prolonged experience to be negligible. This summary dismissal of a means of heating which is advancing in popular favour and in the esteem of authorities on hygiene by leaps and bounds at the present time is unjust to it, and liable to mislead the reader of the text-book. In regard to baths, very little is said about methods of heating bath water; and we have not observed any mention of the use of gas therefor. This is a serious omission in what purports to be an up-to-date treatment of the subject.

The next section, the tenth of the volume, deals with "Lighting." It is written by Herr H. Metzger, a town councillor of Bromberg. Within the very circumscribed limits of 36 pages (a large proportion of which space is occupied by about 50 illustrations), we think the author has treated his subject well and fairly. He starts with natural lighting and the application of prism lights for improving the daylight illumination of cellars and dark rooms. The units of light and illumination are referred to; and we regret to see that the value of the Hefner is given as 0·877 English candle, notwithstanding the revised value of 0·913 adopted by the International Photometric Congress in 1907. In a general introduction to the subject of artificial lighting, a table is given of the volume of products of combustion, heat evolved, air consumed, and cost per unit of light of the more usual methods of lighting. Gas appears to be taken at the high price of 20 pfennige per cubic metre (5s. 8d. per 1000 cubic feet) and current at 60 pfennige (7¼d.) per unit; and it is interesting to note that at these figures the cost of high-pressure gas lighting is less than one-fifth that of electric arc lighting. Also the heat developed is no greater than that of an ordinary carbon-filament lamp—per unit of light evolved.

There is a brief account of gas manufacture and the testing of the illuminating power and calorific value of gas. This is judiciously prepared, having regard to the compression of so large a topic into so small a compass. Street lighting, upturned and inverted incandescent burners and mantles, automatic lighters, meters, and a number of accessories of modern gas supply are next referred to. Then follows a three-page account of acetylene lighting, which is accurate and reliable. Electric lighting is then dealt with; and the section concludes with a tabular statement of the results of comparative testings of the illumination afforded by a variety of electric and gas street-lamps in Berlin and Charlottenburg. The authority for these measurements is not stated.

* Lehmann's Medizinische Atlanten, Band VIII. Atlas und Lehrbuch der Hygiene, mit besonderer Berücksichtigung der Städte-Hygiene. Herausgegeben von Professor Dr. W. Prausnitz, Vorstand des hygienischen Instituts der Universität Graz. Munich: J. F. Lehmann, 1909.

The New Home of the Electricals.

The members of the Institution of Gas Engineers will no doubt be interested to know how the Institution of Electrical Engineers are proceeding in the matter of their new home on the Victoria Embankment. Authority to purchase the property for £50,000 was given last year; and the purchase money has been provided by taking £24,000 from the accumulated funds of the Institution, and by a mortgage on the building amounting to £26,000. The entrance hall to the building is to be enlarged and improved, and the theatre is to be entirely rebuilt. There is to be a total expenditure of about £18,000 on the alterations to the building, and the equipment and furnishing of the library. The new theatre will, it is stated, be a very handsome one, and appreciably larger than that of the Institution of Civil Engineers, in which for some time the Electrical Engineers have been holding their meetings.

Combined Water-Gas and Tar-Carburetting Plant.—The Mid-Kent Gas Company have placed an order with Messrs. R. & J. Dempster, Limited, for a Dellwik-Fleischer water-gas plant, together with a tar-carburetting plant so arranged that the necessary enrichment for the water gas is obtained from the tar, which then becomes suitable for road-spraying. By this means, a two-fold purpose is accomplished; and the Contractors claim that with the combined plant gas having a calorific value of about 345 B.Th.U is obtained, and of such illuminating value that 20 per cent. can easily be mixed with coal gas without in any way reducing its candle power.

Engineering the Birkenhead Water Scheme.—In consequence of the death of Dr. George F. Deacon, who had been retained by the Birkenhead Corporation to carry out their Alwen water scheme, the Water Committee had to find another engineer. Shortly before his death, he had arranged a partnership between himself, his nephew (Mr. Martin Deacon), Sir Alexander Binnie, and Mr. W. J. E. Binnie; but it was never formally entered into. One was completed, however, between the three last-named gentlemen. Soon after this was done, the firm wrote to the Corporation offering to continue the arrangements of Dr. Deacon with them on the same terms; and at the last monthly meeting of the Town Council their offer was accepted. The scheme will be carried out as originally intended, and at the same cost.

Abandonment of the "Technolexicon."—It appears that the "Technolexicon" (the great German-French-English technical dictionary upon which the Society of German Engineers has been engaged for a number of years) has been finally abandoned. The material that had been collected by the Society was submitted some time ago to the Chief Librarian of the Technical High School in Carlsruhe. He examined this critically, and his report is to the effect that, while there are already on hand about 3,250,000 word-slips, only 0·3 per cent. are considered as fully completed. This material is not available as manuscript for the printer, and is classed by the expert who examined it as a rough collection of data awaiting preliminary arrangement. He recommended that it should be regarded as useful mainly for reference, and that the work should be started anew, upon a more limited scale, under expert advice. In view of the large sum already spent on the undertaking, and the many years that have elapsed since it began, the Society finally decided to drop the project.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Dublin.

[From Our Own Correspondent.]

The members of the Irish Association of Gas Managers have a happy and sensible method of arranging for the technical part of the business at their annual meetings. They are nearly all managers of small works, in which large problems are not to be found. The works, too, are far from markets, both for purchase and sale. This has a cramping influence upon enterprise, and places limitation upon energy. Therefore the subjects dealt with by the members themselves are superficial to an extent which is not met with in Gas Associations on this side of the water. It is noticeable that the representatives of the larger gas undertakings stand aloof from the Association—an attitude which is inexplicable, in the light of experience elsewhere. So, being left alone by the leading lights in the industry, the members provide plain fare themselves; and for higher things, they engage a gentleman of skill to lecture to them. It was probably the late Hon. Secretary—Mr. James Whimster, of Armagh—who was responsible for the introduction of this arrangement. Whoever the author of it may have been, the policy is a very wise one. It was wise in conception; and in practice it works to the complete satisfaction of all.

The meeting which was held in Dublin last Tuesday conformed to the lines here indicated. Everyone anticipated that Mr. F. T. Eustace, of Tullamore, would make an excellent President; and the expectation was fully realized. Besides conducting the business of the meeting with an urbanity that was quite refreshing, he gave a Presidential Address which almost seemed to have been framed on the principle of making members wish for more. His leading subject—as was that of the succeeding paper, by Mr. H. W. Saville, of Drogheda—was the working of sulphate plant. The latter described an ingenious device which he has adopted for raising the temperature of the liquor; and the figures he gave were convincing as to Mr. Saville having found a simple and economical method of improving his position so far as regards sulphate. Mr. J. E. Enright, of Tralee, followed with a paper in which there was much homely comment upon familiar from day-to day business in the conducting of gas undertakings—a paper in which the author's opinions were so expressed as to elicit considerable discussion. This exhausted what may be termed the home bill of fare; and of it it must be said that it was all of a wholesome nature. The deeper subject introduced to the meeting was that of lighting by the inverted incandescent burner, upon which Mr. Henry O'Connor, of Edinburgh, lectured—giving, in short and easily apprehended compass, much useful information regarding the principles governing the most recently introduced method of lighting. It was certainly a lecture which will well repay study.

It was with regret that the Association received the resignation of Mr. Whimster, who was the founder of the Association, and who has served it as Hon. Secretary and Treasurer during its existence of twenty-three years. The reason for Mr. Whimster's giving up of office—the serious illness of his wife—added to the feeling of regret. The Association owe much to Mr. Whimster; and their recognition of this fact, in electing him an Honorary Member, was a quite commendable step. His successor—Mr. George Airth, of Dundalk—is a gentleman full of energy and devotion to the Association; and in his hands, there is every reason to expect, the Association will continue to serve a purpose highly beneficial to the gas managers of the Sister Isle.

The Annual Meeting of the Irish Association of Gas Managers was held in the Dolphin Hotel, Essex Street, Dublin, last Tuesday. Mr. F. T. Eustace, of Tullamore, the President, took the chair at 11.30 a.m., by which time there was a goodly gathering of members, augmented later by fresh arrivals.

The President said he was sorry to inform the members that their Hon. Secretary (Mr. James Whimster, of Armagh) was absent, on account of the illness of his wife; but Mr. G. Airth, of Dundalk, was doing duty for him.

Report of the Committee.

The Hon. Secretary (*pro tem.*) read the report of the Committee, in which it was stated that they looked back with satisfaction to the meeting held last year in Holywood. The papers and discussions were full of interest; and Dr. Colman's lecture on "The Effect on Practical Working of the Seals and Pressures in the Hydraulic Main and Retort" was most thoroughly appreciated by all. In furtherance of the decision come to at the last annual meeting, the Committee met in Dublin on the 30th of April, and made the necessary preparations for this year's meeting; at the same time preparing the circular which had been sent out to all the ordinary members, asking for nominations for office-bearers for the ensuing year. Two offices were not left open for voting; it having become an established custom that the Vice-President should be appointed for next year, and that the retiring President should be nominated to represent the Association on the Council of the Institution of Gas Engineers, provided he was eligible. Owing to the sudden and very dangerous illness of Mrs. Whimster in June, the Hon. Secretary was unable to carry to a completion the arrangements for the annual meeting. In view of the remarks made at the last meeting, Mr. Airth, of Dundalk, had kindly offered to give the Hon. Secretary any assistance he might require; and with the consent of the President, Mr. Airth had carried out the final arrangements. In conclusion, the Committee expressed regret at having to record the death of Mr. Harvey, of Belfast, who had been an extraordinary member for the last twelve years.

Report of the District Representative to the Institution.

The Hon. Secretary also read the report of the District Representative on the Council of the Institution of Gas Engineers (Mr. T. J. Reid, of Ballina), as follows:

I only attended two meetings of the Council of the Institution of Gas Engineers during my term of office as your representative on that body. The business transacted during the year was not of a nature to demand more frequent attendance in the interests of our Association. The chief incident during the past year was the death of Sir George Livesey, and the action taken by the Council of the Institution in promoting a Livesey Memorial Fund sufficient to endow a Chair at the Leeds University in the interests of the gas profession. The success attending the promotion of this fund, and the object its promoters had in view—"the perpetuation of the memory of a really great man, in a manner likely to benefit the whole industry"—are too well known to reiterate, further than to remark that the question of contributing to the fund might be considered worthy of our attention. There was one matter dealt with by the Council of the Institution which may possibly affect some of the members of our Association. A letter was received from the Master Printers and Allied Trades Association with reference to the restrictions upon the use of gas-steam radiators and other flueless stoves by the Factory Act, which, unless removed, would appear to place the use of such apparatus in opposition to the requirements of the Factory Inspector.

Auditor's Report.

The Auditor (Mr. G. W. Norman, of Dublin) read his abstract of the accounts, in which it was shown that the income for the past year was £106 3s., and that there remained a balance on hand of £66 17s. 10d.

Mr. R. Harrison (Monaghan) moved that all three reports be adopted.

Mr. J. E. Enright (Tralee) seconded the motion; and it was unanimously agreed to.

Resignation of the Hon. Secretary and Treasurer.

Mr. Airth read a letter from Mr. Whimster, tendering his resignation of the offices of Hon. Secretary and Treasurer of the Association, which he had held since the formation of the Association in 1887. He explained the circumstances (among them being Mrs. Whimster's serious illness) which had induced him to take this step, and asked the members not to re-elect him, but to request Mr. Airth, of Dundalk, who had kindly come to his assistance, to complete the year's work by editing and issuing the report of the meeting, and elect him or some other member to fill the vacated position. Mr. Whimster concluded by expressing his gratitude to the members for their long-continued confidence in him, and for the uniform courtesy and friendliness with which they had always treated him.

The reading of the letter was followed by appreciative remarks from several members on Mr. Whimster's services to the Association; and resolutions were passed expressing condolence with him in Mrs. Whimster's illness, and unanimously electing him an honorary member.

Election of Office-Bearers, Etc.

The President said the Committee reluctantly had to report that the ballot for the election of office bearers had not come up to their expectation—only one-third of the members having voted; and they felt that under the circumstances they should, as in previous years, recommend some names for selection.

Mr. G. W. Norman (Dublin) who had been one of the Scrutineers, said that from his point of view the ballot was thoroughly disappointing. A number of members were nominated for Vice-President, some of whom obtained only one vote, and for the

Committee about twenty names were proposed. What was more, some of the members voted for were not eligible.

After considerable conversation upon the subject, it was left to the Committee to devise a scheme for election; the view expressed by the speakers being that a list of names to be voted upon should be sent down to the members before the meeting.

The following were then elected to office:—

President.—Mr. R. Harrison, of Monaghan.

Vice-President.—Mr. J. Paterson, of Queenstown.

Members of Committee.—Messrs. J. F. Tyndall, of Wicklow; J. Brodie, of Lisburn; and J. Bradley, of Athlone.

Hon. Sec. and Treasurer.—Mr. G. Airth, of Dundalk.

Auditor.—Mr. G. W. Norman, of Dublin.

Mr. Harrison expressed the obligation he felt for the honour conferred upon him in electing him President.

Mr. Airth thanked the members for their election of him to the office of Hon. Secretary and Treasurer. No one, he said, regretted more than he did the circumstances under which they had had the opportunity of appointing him to fill the position.

Mr. Paterson returned thanks for his election as Vice-President.

Representative on the Council of the Institution.

On the motion of Mr. R. Bruce Anderson (London), seconded by Mr. C. W. Stott (Parsonstown), Mr. Eustace was appointed representative of the Association on the Council of the Institution of Gas Engineers.

Place of Next Meeting.

On the motion of Mr. Harrison, Belfast was selected as the place for the next meeting.

New Members.

On the motion of Mr. Paterson, seconded by Mr. Enright, the following were elected members of the Association:—

Ordinary Members.—Barnett, W. H., of Kells; Canning, J., of Balbriggan; Dunn, Matt., of Stockton-on-Tees; Gault, R., of Limavady; Hands, T., of Enniskillen; Scott, R., of Blantyre, N.B.; Woods, J., of Athlone.

Extraordinary Members.—Blair, P., of Birmingham; Blakeley, W., of Dewsbury; Donkin, C. Bryan, of Chesterfield; Duff, C. H., of London; Main, R. B., of Falkirk; M'Ewan, T., of Falkirk; Nuzum, L. L., of Dublin; Todhunter, C., of Belfast.

Members in Arrear.

The Hon. Secretary intimated that the following notice of motion for next year's meeting had been given: "That any member whose name is deleted through arrears of subscription shall have to pay 10s. on re-election." He explained that the bye-law provided that anyone who was three years in arrears fell out of membership; and what was intended was that on re-election he should pay up what he was in arrear.

Presidential Address.

The President then delivered his Inaugural Address, which was published in the "Journal" last week (p. 381). Two corrections, which were made upon it after the dispatch of the copy, have to be noted. Speaking of the capacity of the sulphate plant at Tullamore (p. 382, col. 1), the dimensions of the two stills should be 14 ft. by 2 ft.; and the acid solution is made up to 80° Twaddel at the start of operations.

Presentation of the President's Medal.

Mr. T. Frizelle (Holywood) moved that the best thanks of the Association be given to the President for his instructive address, especially in regard to his system of making sulphate of ammonia. Some of them knew that this added considerable profit to a gas undertaking. Any gas-works, however small—even those of 4 million cubic feet per annum capacity—he should say, ought to have some form of sulphate plant. It was now his pleasure, on behalf of the Association, to present Mr. Eustace with the President's Medal, and to express the hope that he would be long spared to wear it.

Mr. Harrison, in seconding the motion, said he considered the address was the very thing required in an Association such as theirs. He had received a great deal of instruction from it; and he thought every member present would benefit by the President's experience in the manufacture of sulphate of ammonia. He trusted some of them would be encouraged to do likewise.

The President expressed his inability to thank the members adequately for the manner in which they had accepted his address. It was not, perhaps, up to the quality of former addresses. At the same time he knew they had taken it in the right spirit; and he expected they would pass over his shortcomings.

Reading of Papers.

The reading of papers was then proceeded with. These were: "Experiences with a Small Sulphate Plant," by Mr. H. W. Saville, of Drogheda, and "Some Notes and Queries on the Control of Small Gas Undertakings," by Mr. J. E. Enright, of Tralee. The proceedings also included a lecture by Mr. Henry O'Connor, Assoc.M.Inst.C.E., F.R.S.E., of Edinburgh, on "Inverted Incandescent Gas-Lights." Mr. Saville's paper is given on this page, and Mr. Enright's on p. 446. Mr. O'Connor's lecture is unavoidably held over till next week.

Votes of Thanks.

Later in the afternoon,

Mr. R. Bruce Anderson (London) proposed a vote of thanks to the President for the able manner in which he had conducted the proceedings. The meeting over which he had presided had been one of the most successful in the history of the Association.

The motion was carried by acclamation.

The President thanked the members once more for all the kind things they had said about him.

Mr. Paterson thought it would hardly be appropriate that they should separate without proposing a hearty vote of thanks to Mr. Airth, who had stepped in at a very critical time, and had done much for the success of the meeting.

The vote having been heartily accorded,

Mr. Airth briefly returned thanks, and the proceedings closed.

The Dinner.

In the evening, the members and friends, including ladies, dined together in the hotel—Mr. Eustace presiding over a company of about seventy. The toast of "Prosperity to the Irish Association of Gas Managers" was proposed by Mr. Henry O'Connor, and duly acknowledged by the President. "Kindred Associations" was proposed by Mr. R. Bruce Anderson, and responded to by by Mr. R. G. Shadbolt. Mr. A. Mackenzie proposed "The New Hon. Secretary;" and Mr. Airth acknowledged the toast. During the evening, a musical entertainment, organized, as usual, by Mr. G. W. Norman, was greatly enjoyed.

The Excursion.

On Wednesday, a large party, numbering about ninety, went on an excursion, in the finest of weather, to the beautiful district embracing the Powerscourt Waterfall, the Rocky Valley, and the Dargle Glen. Luncheon was served at Enniskerry, and tea at Bray; after which one of the happiest gatherings under the auspices of the Irish Association broke up.

EXPERIENCES WITH A SMALL SULPHATE OF AMMONIA PLANT.

By H. W. Saville, of Drogheda.

[A Paper Read before the Irish Association of Gas Managers.]

On going through the published accounts of the Drogheda Gas-Works immediately after taking charge of the undertaking, I found, among other things, that the production of sulphate of ammonia was far from being satisfactory. My first business was to put the plant in operation, in order to see the method of working, and, if possible, to find out where the fault lay. The plant is only a small continuous one with a still 2 ft. 6 in. in diameter and 8 ft. high; the steam being generated by an independent vertical boiler.

The boiler would work up to 50 lbs. per square inch; but the pressure was kept intentionally low—working between 10 lbs. and 20 lbs. The supply of steam to the still was regulated by a 1¼-inch wheel-valve, necessitating constant attention in order to keep up anything near an equal pressure. The low temperature of the steam at the pressure at which the boiler was worked produced a very sloppy salt, of bad colour, and made a large quantity of mother liquor—in fact, every available vessel was full of this liquid, and a quantity had found its way down the drains.

At the first working, I found one very serious defect—viz., the draining-table, instead of falling to the saturator, inclined the opposite way. On inquiry, I found that when the table was cleared, the drainings were thrown out. No doubt the table was left by the makers in proper condition, but had settled in some manner, and had never been observed.

After completing the first batch of sulphate, I had all the stock cleared out, and made a careful examination of the whole plant. On taking up the boards in the sulphate store, I found that the drain into the well was completely blocked, and a few leakages in the lead floor accounted in some measure for the large quantity of acid used. After having the lead work repaired, the plant put together, and the draining-table re-set, I had a 1¼-inch reducing valve fixed on the steam supply, set at 15 lbs., so that at all times a constant supply of steam was assured. The steam-boiler was then worked at about 40 lbs. steam pressure, which, in figures, meant that the still was receiving the steam at a temperature of 267° Fahr., in place of 213°. The immediate result was that the salt was of a different nature and appearance; and the difficulty of the excess of mother liquor disappeared altogether. Financially, the result was that the production of sulphate was more than doubled, though a less quantity of acid was used.

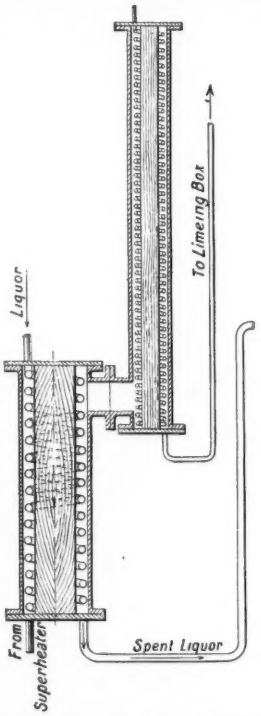
I was then, to the best of my belief, getting everything out of the still for its size that it was capable of producing; but yet I was dissatisfied with the small turnover, the high labour-cost per ton, and the fuel account. It seemed almost a misnomer to call it a continuous still. It was certainly not my ideal of a continuous still, which once started should need nothing but having the steam kept up and the supply of acid seen to; the liquor-feed should be constant, and require no adjusting.

To commence working the plant, we had to steam for four hours; and it would be fourteen hours before any salt was produced. Every time acid was put into the saturator, or lime into the still, the supply of liquor had to be checked until the temperature had been raised again; and at the rate at which we could turn liquor through the still, we could only make about 6 cwt. of sulphate in twenty-four hours.

After considering the question in all its bearings, I had a thermometer fixed on the liquor supply to the still, so as to have exact data on which to work, and had observations taken every few minutes for twelve hours. The results were very unsatisfactory; the maximum temperature being only 125° Fahr., running down to 100° Fahr. when liming, and to 105° Fahr. when charging the saturator with acid. The next experiment was to take the temperature of the spent liquor leaving the still, with a result that somewhat surprised me—the temperature being from 185° to 195° Fahr.

The natural inference was that there was more heat to be got from the waste liquor than from the superheater, if it could be utilized in any manner. The next difficulty was to overcome the drop in temperature when liming; and the only way to do this seemed to be by a constant feed of lime water. The working of the still by gravitation led me to try charging the still with lime in the same way, both having the same pressure to overcome.

I have now pleasure in describing the method I have adopted to overcome these difficulties, and the apparatus which is now in successful operation at the Drogheda Gas-Works.



Saville's Supplementary Attachment to the Drogheda Sulphate Plant.

The apparatus is purely supplementary, and does not alter or interfere with the existing sulphate plant. It consists of two cast-iron pipes, the lower one 1 ft. 1 in. in internal diameter and 4 feet long; and inside this is a coil of 1½-inch steam-pipe, 40 feet long. Through this coil the whole of the heated spent liquor passes. The coil is surrounded by the liquor supplying the still on its way from the (so-called) superheater. The other pipe is 7 inches in diameter and 6 ft. 6 in. long. It contains a coil, 80 feet long, of ½-inch steam-tube. Steam is connected to the coil which enters at the top. The object of the coil is threefold:

(1) To raise the temperature of the liquor surrounding the coils to upwards of 170° Fahr. before starting the still.
(2) To maintain this temperature so that at all times, and under all conditions, the liquor supplying the still is at an almost constant temperature.
(3) The steam and condensed water are passed forward to the elevated liming tank, where it both acts as an agitator and supplies a quantity of boiling water.

The supply of lime is continuous in quantity, and has an even temperature. In this manner, the whole of the steam used in the ½-inch steam coil is utilized and returned to the still either in heated liquor or lime water. It will be observed that in both cases the liquor travels in the opposite direction in the chambers to both the spent liquor and the steam in the coils; so that it passes into the still at the desired temperature.

The two pipes forming the apparatus do not stand over each other. Originally, that was my intention; but on preparing a sketch, I found that it would be difficult to make the connections required. As at present fixed, we can easily (by taking off the flanges) get at any part of the plant, or take the coils out entirely for examination if necessary. All the joints are outside and in sight. Down through the centre of each coil is inserted a wooden core; the object of this being to reduce the space—thus having a smaller volume of liquor to heat and getting to work so much quicker.

I have had thermometers fixed at various points on the plant, so that the steam on both the still and the coil can be set to a nicety. The valves never need be touched until the plant is shut down.

We now get the still in full operation after having steam turned on for forty minutes, while we begin to fish in about 6½ hours. The quantity of liquor passed is increased by 80 per cent. There is no anxiety about liming, which under the old pumping arrangements was apt to be neglected.

One result of using the apparatus is that, instead of working day and night shifts, as much salt is made during the daytime now as in twenty-four hours before; so the night-shift has been dispensed with. The plant takes so little time to get to work in the morning that the attendant can start practically where he left off the day before. In this way, one is able to give the personal supervision so necessary in small works, and which it is impossible to secure during the night.

I may here state that the quantity of steam used by the coil is infinitesimal; and the amount of steam required by the still is so much less that I am getting more than twice the return from steam as formerly—taking into account the increased flow of liquor. As a matter of fact, I have been enabled to dispense with one steam-boiler entirely.

Under the foregoing conditions, in my opinion, the bulk of the free ammonia is liberated in the top and second compartments of the still, leaving the remainder of the still to deal with the fixed ammonia. The spent liquor is now practically at boiling point when leaving, which in turn loses its heat to the fresh liquor. The salt produced is both drier and better in appearance, and will bear comparison with any produced in the best of plants.

The plant described is very simple in its application, and the cost is very low. It returned its first cost in a fortnight's working.

Discussion.

The PRESIDENT said he had followed the paper very closely, and considered that it just bore out exactly what he himself said. It was a pity that the managers of small gas-works would not adopt sulphate plant, because there was no doubt that, after a short time, it paid for itself. There was such a ready market for sulphate of ammonia that it was really a shame to see the liquor cast aside and not used. By the manufacture of sulphate they, of course, increased their revenue. It was not a very costly item; and in any case the liquor itself, if not worked, was actually a nuisance. In his own case, it was so much a nuisance that it cost them from £15 to £20 a year to cart it away outside the town. Last year they made over £40 net profit from sulphate of ammonia, and saved the other £20—a matter of £60 in all. This was, of course, a consideration. The cost of the plant did not exceed £300—he thought it was £287 altogether; so that the investment was paying very well. They were getting good interest upon their money, and they had abated a nuisance as well.

Mr. R. G. SHADBOLT (Grantham), in complimenting Mr. Saville on his contribution, said the effort he had made to deal with the sulphate plant in the condition in which he found it was an object-lesson which all young gas managers might take to heart. He well remembered on being placed in charge of different works, at various times, the extreme longing he had to sweep the decks, and to put in something up-to-date. If all young men were to adopt this line, as they were inclined to do, naturally, they should be able to give a better account of their stewardship. He should like Mr. Saville to give them the yield of sulphate under the conditions he found existing, the yield of sulphate under ordinary conditions, after he had tilted the draining table and stopped the leakages and the excess of mother liquor; and then the increased yield of sulphate after he had added to the plant the method of superheating—and regeneration, might he take it? It all really amounted to this, that he had reduced the use of steam and the waste of heat to the minimum. The successful manager, either in sulphate or gas manufacture, or any of the operations they were called upon to conduct, was not the one who could take 21s. out of £1, but the man who reduced the waste to the utmost minimum. They could not make more out of matter than was in it; but they could reduce—and Mr. Saville had gone on these lines—the waste, which was either dissipated in the atmosphere or which was lost in the ground, to the minimum. Therein, to his mind, lay the successful manager; and if Mr. Saville would continue on these lines, he (the speaker) ventured to predict for him a career which would, at any rate, not be unsuccessful.

Mr. J. PATERSON (Queenstown) said he worked a small sulphate plant—he should say somewhere about the same size as that of Mr. Saville. When he took charge of the works they had an intermittent plant, the results from which were very disappointing. They discarded this, or such portions of it as were found to be inadequate; and, by the introduction of a continuous still, they had materially improved the working results. While the paper was of great interest to all managers of small works who were manufacturing sulphate of ammonia, he thought it would have been of much more interest had Mr. Saville given a few figures such as had been suggested by Mr. Shadbolt. The author told them that the results were disappointing when he took charge

of the works, and that they had been very much improved; but they would have liked to have had a few figures. Perhaps Mr. Saville, when replying, would let them know the quantity of coal carbonized, the amount of sulphate made, the strength of liquor which he employed, the fuel used per ton of coal carbonized and per ton of sulphate produced, also the quantity of acid used per ton of salt made. He was rather surprised, not so much at a reference in Mr. Saville's paper, but in the address of the President, which was not open to discussion, though he would like to make a remark upon it. The President told them the fact that the results were very much improved by the reduction of the pressure on the still; but he did not give them the pressure on the still when he started work.

The PRESIDENT: We started with 15 lbs.

Mr. PATERSON: And there was considerable improvement when it was brought down to 6 lbs. Strange to say, his experience had been the very opposite. He started with 5 lbs. on the still, and the result was somewhat similar to what Mr. Saville found, when he went to Drogheda, by increasing the pressure on the still. He (Mr. Paterson) might mention that he had two separate stills—one for the elimination of the free ammonia, the bottom part of which was the liming chamber. The overflow from this still gravitated into the fixed still. All the steam, with the exception of a little, was introduced into the fixed ammonia still. On this still he had to carry 15 lbs. pressure to get anything like good salt and to maintain the temperature necessary in the saturator. He had not two separate gauges—one for the fixed and the other for the free ammonia still. All the steam was admitted through the fixed ammonia still; and the gases flowing from this passed up through the free still. He would like to know what distinction there was between Mr. Saville's steam-boilers and the sulphate plant. Were they far removed? He himself had some trouble in this connection. His steam-boiler was fixed up in the retort-house, about 150 feet from the sulphate plant; so that he lost a considerable amount of heat. The temperature was very much reduced by the time it arrived at the sulphate plant. He carried between 45 and 50 lbs. of steam on the boiler.

Mr. R. BRUCE ANDERSON (London), regarding the remark which Mr. Saville made about draining in the wrong direction, said that the very first time he went over to Ireland was about a sulphate plant with which there was some difficulty. The defect he found out was that the off-take, instead of draining away from the saturator, was draining back to it. Nobody looking into the sulphate-house would have seen that the pipe was draining in this direction, but would have thought it was away from the saturator. It was merely an optical illusion. The mechanic who put it up no doubt thought he had drained it away, but, as matter of fact, he had drained it back to the saturator. The mere introduction of liquor into this pipe solved the whole difficulty. The idea Mr. Saville had suggested, of working the lime into the still by gravitation, was, he thought, a very useful discovery on his part. They had either to have a very small pump, or a large pump working at long intervals. The wear and tear on the lime pump was of considerable amount; and if the lime could be successfully run in by gravitation, it would affect the item of wear and tear, which was well worth consideration. As to the size of works sulphate plant could be profitably introduced into, he had very great doubts whether it was worth fitting up plant in works producing under 5 million cubic feet; and even then they would find that the wear and tear hardly warranted its introduction. The President talked of his plant having cost £300, and having had it in use for three years. Already, he understood, he had had to renew part of his superheater. He saw a number of Dellwik plants that had gone out of use, which either were not worth repairing, or the men in charge did not know what to do. Sulphate plants were liable to get out of order. They had no use for them for perhaps three months out of the twelve; and what with expansion and contraction, the wear and tear was very considerable. With regard to steam, he should say that the higher the temperature they could get steam the better.

Mr. W. E. YOUNG (Tipperary) pointed out that Mr. Saville had not stated which way he admitted steam to the saturator. In his experience of sulphate of ammonia making, he lifted the carboy over the tank, and simply emptied the contents in. He was talking to a manager recently who had adopted the steam method, but had to give it up. This manager asked him if he could recommend any good way of getting the sulphuric acid into the overhead tank. He understood how the President did it; but he wanted to know how Mr. Saville did it. Did it make a difference in the strength?

The PRESIDENT: No, it does not; there is no steam wasted with the injector to interfere with the strength of the sulphuric acid.

Mr. T. FRIZELLE (Holywood) thought it would not be difficult to get the sulphuric acid a few degrees stronger from the makers. He had got acid stronger before now, with very good results.

Mr. SAVILLE, in closing the discussion, said that one speaker had asked why figures were not given as to certain things. It was difficult for him to give figures, for the simple reason that he worked the liquor of two other works as well as his own, and he had great difficulty, therefore, in getting at the production per ton. So far as he could make out, when he went to Drogheda, the make of sulphate was about 12 lbs. per ton of coal used. After he put the draining-table right, he was getting about 25 lbs. of sulphate per ton, which, he considered, with the plant he had, was pretty fair. He had not had a full year of the latest arrangement; but he thought that he was now getting well on to 30 lbs. As a matter of fact, he had already, since March, made more sulphate than they did in the twelve months before he went there. He thanked Mr. Shadbolt for his kind remarks. His own liquor he worked about 5° Twaddel. If he worked up to 7½°, he found that he was losing a certain amount of ammonia; and so he kept down to 5°, and practically got all there was out of it. He was rather surprised at the remark about the increase of steam, because he found that, unless he increased the steam very carefully, he got the saturator full of mother liquor. As a matter of fact, he was working with about 2 lbs. of steam in the still. So far as he could get at it, the quantity of acid used was about 2000 lbs. per ton of sulphate, which was a good return. He found that the steam, in working through the coil, was not sufficient to agitate the liquor; and he had to put a little extra steam into it. They would note that he said he got up the heat of the liquor, before entering the still, to 170°. He did heat it up to over 200°; but he found he was evaporating all the liquor, and that there was nothing in the top chamber of the still to seal it. So he found that he could not get any good returns over 170° on the coil. As a matter of fact, he could boil it out. Therefore he put a little steam in, so as to keep the lime in a milky condition. The still was only 8 feet from the steam-boiler. The different parts of the plant were all closely allied the one to the other. He had no injector for the acid. In the works he was in before, he had the experience Mr. Paterson had had—the acid was so much weakened that he had to keep putting fresh acid from carboys into the saturator to keep it up to working strength. He decided that he would never use an injector again. Of course, an injector, if it did not weaken the acid, was the best way; but he had to take the acid of the strength he could get it. He thanked the members for their kind attention. There were a lot of experiments included in the paper which would not interest them. He had many failures before he got success; and the paper he had laid before them was more or less the outcome of these failures.

SOME NOTES AND QUERIES ON THE CONTROL OF SMALL GAS UNDERTAKINGS.

By J. E. ENRIGHT, of Tralee.

[A Paper Read before the Irish Association of Gas Managers.]

The requirements of the gas consumer are changing; and we must alter the terms and conditions of supply to meet such requirements and demands for a better and more economic light and fuel. We have all of us to meet competition in some form, whether it be from electricity, petroleum, or producer gas plants; and in some cases all three have to be met with. Although some of the matters I purpose dealing with in this paper have been dealt with at recent meetings of our Association, still they are of such an important nature that I make no apology for enlarging on them, and trust the paper may at least be the means of promoting a valuable discussion.

COMPETITORS WITH GAS.

To my mind, one of the most serious opponents that we in small provincial towns have to contend with in lighting is undoubtedly petroleum. How often will it be found in such towns that there are almost as many shopkeepers burning oil as there are using gas? How often also will one find both oil and gas being used in the same shop; and, more often still, gas being used in the shop and oil in the remaining portion of the house? The same remarks apply to the number of oil and coal stoves that are being used for heating and cooking purposes. How best are we to meet and grapple with this competition? I should say by adopting the prepayment meter system, free piping and fittings, by using more modern and up-to-date business methods than is our wont to do by not being content with what has been done, but seeking to develop our present resources; and also by looking ahead for fresh fields for our enterprise. In a word, by putting the advantages, the cost, and all else we claim for gas, whether for lighting, heating, cooking, or power purposes, before the public with all the intelligence at our command.

Is the penny-in-the-slot meter as popular as it might be? If not, what is the cause of it? On looking over the "Gas World Year Book for 1909," one cannot fail to be struck by the amazing difference in the price charged to prepayment consumers when compared with that charged for cooking purposes to the ordinary consumer, notwithstanding that at least two-thirds of the gas used on the prepayment system is for cooking. The table on next page will serve to illustrate the anomalies to which I refer. In the table, it will be noticed that I have assumed 12,000 cubic feet per annum as being a fair average consumption by the prepayment consumer, and have taken two-thirds of this amount—viz., 8000 cubic feet—as being used for other than lighting purposes. This average I consider conservative, as my own experience in working results in an average of over 16,000 cubic feet per annum. It may also be well to point out that, in the cases which I have selected for comparison, the additional price charged to prepayment consumers has not been taken into account.

I presume any of the undertakings in the table (p. 447) would be well pleased to have a few hundred extra consumers, who would each consume 12,000 cubic feet per annum, and sell it at their

—	Lighting Price per 1000 C. Ft. Ordinary Consumer.	Cooking Price per 1000 C. Ft. Ordinary Consumer.	Difference per 1000 C. Ft.	Amount of Difference per Annum on an Estimated Consumption of 8000 C. Ft. for Cooking.	Amount of Difference per Annum on the Total Estimated Consumption of 12,000 C. Ft.
	s. d.	s. d.	s. d.	£ s. d.	£ s. d.
1	6 8	5 10	10	6 8	10 0
2	5 6	4 4	1 2	9 4	14 0
3	5 5	4 2	1 3	10 0	15 0
4	6 8	5 0	1 8	13 4	1 0 0
5	4 2	3 4	10	6 8	10 0
6	6 8	4 2	2 6	1 0 0	1 10 0
7	6 8	5 0	1 8	13 4	1 0 0
8	5 3	4 3	1 0	8 0	12 0
9	5 7	4 9	10	6 8	10 0
10	5 9	4 6	1 3	10 0	15 0
11	5 0	4 0	1 0	8 0	12 0
12	5 6	4 5	1 1	8 8	13 0
13	6 8	5 10	10	6 8	10 0
14	5 0	4 0	1 0	8 0	12 0
15	4 3	3 4	11	7 4	11 0
16	5 0	4 2	10	6 8	10 0
17	3 9	2 8	1 1	8 8	13 0
18	6 0	5 0	1 0	8 0	12 0
19	7 0	3 0	4 0	1 12 0	2 8 0
20	6 3	4 7	1 8	13 4	1 0 0
21	6 8	4 2	2 6	1 0 0	1 10 0

special cooking rate. Surely if this can be done, and a profit earned at the price named, it is quite evident that gas can be sold to the prepayment consumer at the same price as that charged to the ordinary consumer for lighting, notwithstanding all that has been urged to the contrary. How, then, is the additional charge justifiable? It seems to me that the method heretofore adopted, of fixing the additional charge on the ordinary selling price, is altogether at fault. For we must remember that the prepayment business is of our own making—that it is an auxiliary to our ordinary business, and that it was adopted as a means to an end. Hence every possible inducement and encouragement should be offered to probable consumers, as an increased output generally tends to reduce manufacturing costs. Indeed, there are few undertakings in Ireland that could not afford to increase their output by a few million cubic feet annually without in any way increasing their manufacturing charges—viz., management, carbonizing labour, and rent, rates, and taxes. Especially would this be so in the case of the gas used by the prepayment consumer for cooking purposes, as it is generally a day load, and almost invariably a summer consumption. Under these circumstances, the basis of calculating the price to be charged should be the net cost of the gas into the holder.

Let us assume a case in which the cost into the holder is 1s. 3d. per 1000 cubic feet, with an average consumption of 12,000 cubic feet, and the cost of installation £5, to be recouped (say) in ten years. The annuity on this amount, at 10 per cent., would be 10s. per annum, or 10d. per 1000 cubic feet. This, added to the cost into the holder, would make a total net cost of 2s. 1d. per 1000 cubic feet; so that anything over and above this would represent profit. Consequently, with the price of gas at 5s.—and this is a fair average for Ireland—it would mean a profit of 2s. 11d. per 1000 cubic feet. It can scarcely be denied that this would allow for a reasonable profit, after meeting the other proportionate capital charges for distribution, maintenance, &c., that should also be charged to this account. In all the cases cited, it will thus be seen that the difference between the price charged for ordinary and for cooking purposes is more than sufficient to redeem both capital and interest on an average consumption of 12,000 cubic feet. *En passant*, it is important to remember that by free fittings is not to be understood the wholesale fitting of houses, but rather the supplying of a plain, substantial bracket or pendant in kitchen, dining-room, and hall, with cooker and meter; the discretion of the manager to be used as to the merits of individual cases.

The importance and advantages of incandescent lighting cannot be too forcibly put before the public. A most important point, however, for a manager when adapting himself to push incandescent lighting is first to obtain the burner most suitable to his district, the quality of his gas, and the consumption per hour; for, as we are all aware, there are innumerable cheap and worthless burners on the market, some of them consuming 6 to 7 cubic feet per hour, and not yielding anything like the light to be obtained from genuine burners of recognized makers, which, while only consuming 3 to 4 cubic feet per hour, will give a light of from 70 to 100 candle power. All incandescent burners, whether upright or inverted, should be fitted with both gas and air regulators, and of a kind to take standard size fittings, mantles, globes, &c. Armed with a burner of this class, the manager has in his hands an article that he can with confidence recommend to his consumer, and which can compete, light for light, with any other known form of lighting.

Future Policy of Gas Undertakings.

It thus behoves us to consider from every aspect how best to further, from a commercial point of view, the interest of the industry which we have so much at heart. The future policy of a gas undertaking must be an enterprising one, offering the best possible service to the public at the lowest price, doing more for the consumer than heretofore, and endeavouring to prevent our consumption coming to saturation point; for when that is reached, it means the practising of so-called economies. It is an admitted fact that no business was ever built up or successfully maintained on such a policy.

I am strongly of opinion that the time has now arrived when all gas undertakings, be they company or municipal, should adopt the erection, maintenance, and supervision of consumers' fittings. A show-room, displaying the most modern gas appliances, fittings, &c., also greatly tends to enhance the popularity of gas, as a well-arranged display is undoubtedly the most effective advertisement, and will win over consumers when any amount of argument or canvassing would fail. These, beyond any doubt, would give a great impetus to the sale of gas, and at the same time enable the consumer to have his fittings erected, and his alterations or repairs carried out, at a cost much less than that which is generally incurred, with, besides, a guarantee of entire satisfaction. This is only natural to expect; for if the work is carried out by the gas undertaking, it does not finish when the fitting is completed. It is also to our interest to see that the fittings used are of the most suitable kind for their various purposes. How often do we see the fittings and connections from the meter totally inadequate for the number of lights they were even originally intended to supply? How often do we see incandescent burners on fittings totally unsuited for use with such burners? How often, also, will one see them, when alight, with the gas flaring over the mantle, and not giving as much light as a good candle?

These are only a few of the many disadvantages from which the consumer would be relieved by a properly supervised fittings department under the control of the gas undertaking. The establishment of such a department does, and would no doubt, meet with powerful opposition from some quarters. Contractors would probably feel piqued at what they would consider an impudent infringement of their rights. The general public might view the arrangement with scepticism—perhaps believing it to be only another means towards securing additional profit, and not calculated to benefit the consumer. This is certainly a fallacy; for while the advantage would be mutual, as far as the consumer and the gas undertaking were concerned, the consumer would, nevertheless, have the greater gain, for it would be the bounden duty of any soundly-worked undertaking, where money was not actually lost in the fittings department, to give to the consumer not alone the full benefit of such a department, but also an indirect participation in the profits. Not alone would there be a better light, but there would also be increased sales; and with increased sales would go hand in hand a reduction in the price of gas.

The consumer would soon come to realize that, by a hearty co-operation with the gas undertaking, he was not only having his work cheaply and satisfactorily done, but that he was getting the maximum benefit at the minimum cost. It would then not be a very difficult matter to convince consumers of the merits of the various appliances adaptable to the use of gas. How is this to be accomplished? In the case of a company, it ought to be an easy matter to convince the directors of the necessity of establishing their undertaking on sound, commercial business lines, by adopting the most up-to-date business methods of increasing the sale of gas and enhancing the value of their property.

With an undertaking controlled by a municipal authority, however, it is a very different matter. You are met with the argument against municipal trading. Why this should be, I fail to understand. Have they not already to some extent adopted municipal trading, when they assumed the control of the gas undertaking? I also fail to understand why this argument is used almost solely against the gas industry. Have we not the trade organizations of the country asking for municipal workshops? And have we not the local labour bodies, through their representatives, demanding direct labour from the county council? It seems to me altogether unreasonable to declaim against a gas undertaking for fitting everything connected with the commodity that it supplies—in fact, the one is so closely identified with the other that they form as it were but one industry. The fitting indeed is of vital importance, for where that is defective the gas, however good its quality, is generally unjustly blamed. Are we not, alas, too familiar with the complaint "the gas is bad," when on investigation it is found that, in 90 per cent. of the cases, it is the fittings that are at fault? Such complaints as these, however unfounded, become an insuperable difficulty in the way of canvassing new consumers, and hence a very great barrier to the success of the gas industry. There is no justification whatever for the generally urged platitude that it would injuriously affect local labour. On the contrary, it would but tend to increase labour by enlarging the field of operations—that is, by extending the use and application of gas. It might, it is true, minimize the profits of the local contractors in this branch of business; but then the public good is always to be considered before the interest of the individual, and the universal boon that would be conferred on the public by this system would be sufficient vindication of its adoption.

Producer Gas as a Competitor with Coal Gas.

That producer gas is a keen competitor with town gas for power purposes, none of us can deny; and it is, moreover, a fact that those who control gas undertakings cannot afford to ignore. There seems to be a feeling among most of us that it is practically useless and hopeless to compete with producer plant. No doubt at first sight this would seem so, when we read the glowing statements and ofttimes misleading estimates, which are put forward

by the manufacturers of such plants. On closer observation, we may well ask ourselves, Are we so hopelessly out of the competition as those manufacturers would fain make us believe? As one who had a special opportunity for closely and practically investigating the question, I certainly say we are not, and that for engines up to 30 or 40 H.P. competition can still be met, according to local circumstances. The convenience and reliability of town gas alone has a very important bearing in making comparisons as to cost, &c. This is a subject in which managers of small gas undertakings must be well posted, if they are to successfully grapple with competition from this quarter. The statements made by plant manufacturers appear sometimes so plausible that, if we are not thoroughly conversant with the different aspect of the question, and ready to state our case intelligently by pointing out the many disadvantages of the producer plant as well as its advantages, it will be very hard indeed to convince the consumer, who very often loses sight of the following points:—

1.—The uncertainty of supply.
2.—The extra attention to cleaning the working parts of the engine that come in contact with the gas.
3.—The extra cost of attending to the plant.
4.—The extra cost of repairs—a very considerable item.
5.—The extra cost of engine, electrical ignition, &c.
6.—The cost of town gas supply, meter, &c., to connect up to engine as a stand-by, and for starting purposes.
7.—The extra capital involved in the installation of the plant, and engine foundations for both, together with interest and depreciation.

Without doubt it is a very serious competitor, and therefore we must ask ourselves how best to meet it. In this, as in other matters, prevention is better than cure; for if we are going to compete with this rival, it is far easier to keep it out altogether than put it out when once installed. Exceptional circumstances require exceptional methods; and it appears that the only solution to this difficulty lies in the fact that we must reduce the price of gas. We in small works are most advantageously situated in this respect, having regard to reserve of manufacturing plant at our disposal, enabling us to reduce the price to exceptional consumers. If we can supply public lighting at a reduced rate, as most of us do, why not deal similarly with such consumers? I think we could do worse than follow the lead of that pioneer undertaking in the gas industry (the Manchester Corporation), and offer to exceptional consumers gas at wholesale prices for a specified consumption, rather than leave any avenue open to our rivals of which they are only too ready to take advantage.

I know of two producer plants—one of which has been working for over two years, the other lately erected by a consumer whose average consumption was about 160,000 cubic feet per annum. The latter, to drive an engine of 13 to 14 H.P., was erected to supplant gas lighting by generating electric current for lighting and power purposes. The consumer was interviewed; but having a preconceived prejudice in favour of electric lighting and producer gas plant, argument was useless. As the electric load will be intermittent and batteries necessary, I am fully convinced that this consumer will yet get discouraged at lighting up the generator for a one or two day run per week, and will eventually fall back on town gas, for which a service and meter have been erected. But the former case is a more serious loss; being that of a large manufacturing firm whose yearly consumption averaged 750,000 cubic feet. This firm, in the first instance, had a 17 H.P. engine working on town gas. Requiring more power, and being convinced by the makers of a producer plant that they would effect an enormous saving as compared with the cost of town gas, they put in a 30 H.P. plant and engine. After the first year's working, their bill for town gas was, however, larger than ever. This was encouraging news; but, unfortunately, too good to last, as it proved to be. On investigation, it was found that, in order to drive the whole of the machinery, town gas had to be resorted to, as sufficient power could not be derived from the producer plant. It then became necessary for them to consider the erection of a larger plant and engine. After repeated interviews, this consumer, who had been using the plant for over two years, agreed to the following comparative table of costs, after a series of tests per one week running in each case.

Town Gas.	£ s. d.	Suction Gas.	£ s. d.
17,600 cubic feet at 3s. 4d. per 1000, as per meter reading	2 18 8	22½ cwt. of anthracite at 30s. per ton	1 13 9
		Attendance (actual time only)	0 12 0
		1000 cubic feet of town gas for starting purposes .	0 3 4
			£2 9 1

Note.—To this must be added interest and depreciation on the plant. The cost of repairs, which in this case amounted in the first year to £15, and in the second year to over £60, and of which no account has been taken in making these comparisons.

As a result, a reduced price of 2s. 11d. per 1000 cubic feet was mentioned, which this firm were willing to pay, and which would have left a substantial profit to the gas undertaking. The governing body of the undertaking refused to entertain the proposal, with the result that the consumer was lost to town gas who, with the additional power required, would now be using approximately 2 million cubic feet per annum. To supply this power, a 60 H.P. suction plant and engine has now been erected.

Advantages of Gas Association Meetings.

To the general public and gas consumers—aye, and even to directors of companies and members of gas committees—these meetings of our Association may, and I presume do, appear of little value except to those who attend them. To us managers of small undertakings, they are of very great importance and advantage, not alone to us, but more especially to the undertaking whom it is our lot to serve. We pride ourselves, and justly so, on the greatness and importance of the gas industry, on the progress that has been attained, both in the process of gas manufacture and in its application commercially. But can we pride ourselves on our position? Has our status as a body advanced in any degree proportionately to that of the industry we have the honour to represent? I fear the answer must be in the negative; for while the undertakings which we serve reap the fruits of our conferences, they stand altogether aloof when there is a question of contributing financially to the success of our Association. Not alone do they not allow a manager's expenses on such occasions, but they look upon his absence as a kind of holiday.

Surely this is a grievance that requires to be redressed. If the undertakings were not willing to allow the expenses of the manager while attending the meetings of the Association, which they might reasonably do, as the meagre salary of many managers can ill-afford to meet the payment, they could at least contribute a fixed sum annually to the Association. A fund would thus be formed, out of which the expenses of the annual meeting of the Association could be defrayed. This would enable many managers to accept the presidency of the Association, who may now be compelled to refuse it, owing to the expense which it necessarily involves. It would, moreover, be a decided boon to many of the small undertakings, as meetings of the Association could then be held in many of the provincial towns, and the visit of the members on such an occasion would give a great fillip to the local undertaking.

Relative Position of Director, Manager, and Secretary.

With regard to the position of manager, especially in small undertakings, so much has already been said and written on the subject that it might seem superfluous to introduce it here; but it is a question with so many aspects, and concerning which there are so many grievances, and, above all, for which so little practical good has been done as regards ameliorating of the position of manager generally, that a few remarks may not here be out of place. It seems to me that, even among directors and members of committees of gas undertakings, a vague indefiniteness exists as to the authority, scope, and responsibility of a manager. Of the latter, indeed, he generally gets more than his share, having regard to the manner in which his authority and the scope of his operations are restricted, especially so in the case of municipal gas managers. "One who manages; one who has the guidance or direction of anything; one who is directly at the head of an undertaking." This is the position of a manager clearly and concisely defined according to authorities on the English language. Does this definition apply to the position and authority of a manager as universally recognized in our profession? I am aware that in a great many cases it does not. Instead of being directly at the head of an undertaking, in which case his advice would be sought for and generally acted upon, he is more often called upon to carry out the directions of the governing body, from whose deliberations he is ofttimes altogether excluded—and this, too, where his opinion and experience would be of the utmost importance. It also frequently happens that while the manager may be consulted when matters purely technical are under discussion, yet when there is a question of finance or the like, he is either mistrusted or overlooked, as if his opinion were not worth having. It would be difficult, if not impossible, to find a parallel to this mode of action in any other commercial business. Who should be more competent than the manager to advise, direct, and suggest in everything pertaining to the undertaking of which he is at the head? And though he may be somewhat lacking in financial acumen, still his practical knowledge and varied experience will often make amends for this, and should in any case be of great assistance to either directors or gas committees in their deliberations.

It also frequently happens that the secretary—who may not have, and generally has not, any technical knowledge whatever (that is, where his position is distinct from that of manager)—is often admitted into such deliberations and consulted about matters altogether within the province of the manager, thereby causing the former in many cases to circumscribe, if not altogether to usurp, the authority of the latter, and thus cause friction, which considerably militates against the success of the undertaking. Indeed, I strongly incline to the opinion that many of the grievances under which managers labour are traceable to this source. This is undoubtedly the cause of the almost universal grievance of the manager being unable to obtain access to the accounts generally, and other details and particulars with reference to the working of his department.

It appears to me that one of the first duties of a director or other person occupying a position of authority or responsibility in connection with the gas industry should be to make himself fully acquainted with the rights and privileges conferred, as well as the duties and obligations imposed, upon the manager of a gas

undertaking. Fortified with this knowledge, he would readily understand that it is of primary importance that all the accounts, to which the manager should at all times have ready access, should be so kept as to enable the manager to obtain at any time the correct cost and working results of the undertaking. If such is not the case, it is almost impossible for the manager to know what branch of the undertaking is unprofitable or extravagant.

To the manager, it is of little importance whether he serves under a board of directors, a municipal authority, or associated management, provided his position is an improving one, which some hold to be more often the case in the latter service, though this is a debatable point.

Gas Managers in Municipal Service.

This brings me to what I consider a very important point—viz., the service of managers under municipal authorities. It is hardly necessary to point out that the appointment of managers in such cases is not subject to the sanction of the Local Government Board, and he is not therefore strictly an officer of the council or corporation. Why is this? Is it that his position is so unimportant as to be unworthy of the notice of the Local Government Board? To me it seems so; for are not the appointments of the town clerk and his assistant, the town surveyor, rate collectors, medical officers of health, executive sanitary officer, and even sub-sanitary officer, subject to such sanction? Surely his department, whether considered from a financial point of view or from the benefits it confers on the ratepayers generally, is not the least important, nor is his position the least responsible. While the Local Government Board will not set its seal upon his appointment by requiring its sanction, its auditors will, nevertheless, surcharge or question expenses incurred by the manager when in the discharge of his duty, and which have been unanimously voted by the council. I merely touch on this matter here in the hope of hearing the views of other members of the Association on the subject, which I have not heard discussed before.

I cannot claim for my paper any merit as to originality, much less style. As I pointed out in the beginning, I have but endeavoured as it were to sow the seeds of a few stray thoughts, which I hope will bring forth a fruitful harvest of very valuable discussion.

Discussion.

The President said the paper raised many points of interest. He certainly agreed with the view Mr. Enright took with regard to the position the gas manager occupied. He should occupy the same position as any other official did.

Mr. J. F. Tyndall (Wicklow) said that, in the beginning of his paper Mr. Enright spoke as to the charges for gas. This was a matter he felt strongly upon, and had something to say about in a paper he read the year before. He must congratulate the author on the figures he obtained. It was a yield which was very creditable. The figure of 12,000 cubic feet, which he assumed, he could not accept. His own figure was nearer 9000; and on this he must base any arguments he had to make regarding the justifiability of the extra prices which were put upon slot-meter consumption. Mr. Enright said that he assumed the figure of 12,000 cubic feet, and asked how the additional charge was justifiable. He thought that an extra charge was very justifiable for the capital outlay which was necessary for this class of consumer. It was an utter absurdity to say that the ordinary consumer should be treated on the same terms as the one they had to lay out a capital of £5 to get. It was only fair, he considered, to the ordinary consumer, who had been connected with the undertaking ever since it was in existence, that any extra charge which was necessary to gain a new customer should be proportionately borne by the new consumer. Mr. Enright said that a 10 per cent. annuity on £5 amounted to 10s., or 10d. per 1000 cubic feet, which he added to the cost of gas into the holder. Why did he not apply the same argument to the ordinary consumer? If it were not for the ordinary consumer, how could they have the plant to deal with the slot consumer? Somebody must begin it. Why not apply the argument to both? If gas cost 1s. 3d. into the holder, and they could be assured of a consumption of 12,000 cubic feet for each consumer, why did he not consider this sufficient? They could get new consumers at too dear a cost; and he considered that, on the terms stated in the paper, the slot consumers were too dear. In his own case, 9000 cubic feet was the average. This represented, on his present rate, 50s. 6d. Taking from this the 10s. which Mr. Enright allowed as an annual instalment, he was left with 40s. 6d., which, divided by the 9000, gave him 4s. 6d. per 1000 cubic feet. Yet he was charging ordinary consumers 4s. 11d. for light, and 4s. 7d. for other purposes, which was 4s. 9d. all round, *plus* meter-rents. With the exception of this, he could very readily agree with most of the paper. He thought it was to the interest of the undertakings in which the members were engaged that they should have their expenses paid when attending Association meetings. There was hardly a member attending the meetings who did not go back with some ideas he had not entertained before. In his district, they pushed business on the same lines as Mr. Enright advocated. They paid just as much attention to the commercial aspect of the selling of their gas as they did to the manufacture. They advertised locally; they offered free facilities for cookers and slot installations; they kept a staff of fitters to attend to complaints; and they undertook practically everything from the manufacture from the coal to the consumption of the gas. He thought this was the proper position for every manager to take up, whether he served a municipality or a company. In regard to suction-gas plants, they were very often inclined to look too much upon the fact that town gas was high-priced, and to give up the fight. Mr. Enright enumerated seven different items which had to be taken into account in connection with producer plants. There was one such plant in their town which had been running pretty successfully during the last two or three years; but now, for the first time in two years, the owners of the plant were drawing a supply of gas from them. It was at the end of two years' running that any real difficulty was experienced with producer gas plant. In the case he referred to, they had to instal a very elaborate set of accumulators; and he had been told that the interest on the cost of this was more than their gas account used to be for twelve months.

Mr. H. W. Saville (Drogheda) said, so far as the Irish Local Government Board were concerned, he would just as soon not be an official under them. He had an instance in point. They had a Gas Act; and one of the clauses of the Act provided that they must order their accounts in accordance with the Gas-Works Clauses Act. The Local Government Board Auditor said: "This is the style I want." They showed him their Private Act; and he then said: "You can make them in that way if you like; but you must also make them in accordance with ours. I will not audit your accounts." The question arose as to the power to surcharge an officer who had not been appointed, or whose appointment was not confirmed, by the Local Government Board. He went about the matter to their Solicitor, who said: "If your Board are prepared to fight, I will fight it." This was a position which required clearing up; and he thought they were in just as good a position as if they were under the Local Government Board.

Mr. W. E. Young (Tipperary) thought they were themselves responsible for a good deal of their grievances. Though they had the meetings of the Association, there was considerable lack of organization among them. For instance, in some works the manager had what might be called a manager's duties; in other places, he was a mere lackey, if he might use the expression. There was also the question of salaries to be paid. An organization such as theirs, in conjunction with larger organizations, should be able to lay down a scale of fees and duties which they, as members of the Association, could subscribe to; and he believed, if this were done, their lot would be better—and not their lot only, but the lot of those whom they served, because it stood to reason that if their employers got a man at a cheap figure they must expect inferior service. It should be within the province of such societies as theirs to formulate a scheme to define a manager's duty, and also to define his salary. He believed this would be good for the industry in general. He was not labouring under any grievance himself, but was judging by the numerous advertisements which appeared in the gas journals from time to time, in which they had gas-works of 60 or 70 million cubic feet offering £100 per annum. How they got men to take such positions was surprising. This should be considered by their own and other societies, with a view to its being put a stop to.

Mr. Matt. Dunn (Stockton-on-Tees) considered that in many ways Mr. Enright said identically what probably most of them who had an inclination towards progress and the advancement of their own particular industry would have said. He (the speaker) had no desire to enter into the dispute about prepayment meter rental as compared with charges by ordinary meter. The author had dealt with the subject in a fairly reasonable way. What he wished to mention had reference to gas-burners. In recommending burners to their consumers, they must always make it a point to put forward the very best they knew of. The best was really the most economical. He was pleased to see the reference to the regulated burner. They could not do too much in this line. He challenged their foes to show what they could do; and it was astonishing what he could do with a few burners, properly controlled and fitted up with other up-to-date appliances. He had always tried to bring under the notice of consumers the necessity for gas and air adjustment. People were getting to understand this. He was much in favour of maintenance, in regard to which he would go the whole hog, and have everything kept up to concert pitch. They must do this simply because they found that their opponents were spreading all sorts of nonsensical ideas, even among coal-gas consumers, and taking every advantage they could. But they could afford at all times to tell the truth. In showing people what they could do, they could always make very liberal discount, and yet have ample to spare to combat electric lighting. He was very pleased to see that show-rooms were being largely adopted by corporations. In many cases there had been a lot of fighting to get them. He did not think it was right that they should have their business restricted by a few who practised gas-fitting, because in many instances they found that these gas-fitters had developed into electric lighting engineers. They would find this, too, that in gas-engines, as compared with power engines, they had nothing to fear. They in Ireland might have, he was sorry to say, when they looked at the prices; but he had no difficulty whatever in fighting power-gas plants. They had at Stockton a power-gas plant put up in a large works, and the town gas removed; but after a week's working, the people asked them to put their 6-inch main back again. They were working with town gas to-day, and their own plant was standing idle. Their maximum price was 2s. 3d. per 1000 cubic feet, with a differential price of 4d. for prepayment meters. This difference in price covered the installing of a light and pendant, and giving a griller free. When they could come down to 1s. 6d. or

2s., it gave them an exceedingly good chance of effectively combating electricity.

Mr. H. O'Connor (Edinburgh), regarding the 8000 cubic feet which Mr. Enright referred to as having been used for cooking purposes, asked if this had been ascertained by the use of a discount meter, or by separate meters, so as to get at the separate amounts. He was afraid that two-thirds was rather a high figure for cooking. He had elsewhere given his reasons for thinking that a higher price should be charged to prepayment meter users; and he need not now go into this question. But one great point was the higher cost of collection. The cost of gas into the holder, which Mr. Enright referred to as 1s. 3d., certainly seemed to him to be a very low one, in view of the charge of 5s. per 1000 cubic feet to consumers. Possibly the one price had been put too low, if the other was the average price in Ireland. With regard to the giving of good burners, there could be no question that they were necessary at all times. For a number of years the Glasgow Gas Department always had in the gas office a number of burners; and if complaints came in, they gave new ones to the consumers. Mr. Foulis told him that, in 99 cases out of 100, these people never came back to complain of the gas. Of course, this was in the days of the flat-flame burner. If they could manage to educate gas-fitters and plumbers a good deal more, they should have an immense help in extending the use of gas, both for lighting and heating purposes; and really the only reason why gas companies or gas managers required to take gas-fitting into their own hands was because the fitters and plumbers would not render themselves up-to-date in the matter of using gas for various purposes. He had been engaged, at different times, to give popular lectures to fitters and plumbers and to local consumers. He had tried to show them, by means of simple experiments and burners of different kinds, what could be done with gas, both for lighting and heating purposes; and it had been found that a little knowledge obtained in this way had been of considerable use in extending the applications of gas. There was no doubt that, if they could educate the gas-fitter, they would get a man who would then proceed to educate the gas consumer. And, after all, it was the gas consumer they wished to get at. The matter of fittings in houses was very important in Scotland, because a reduction of candle power was taking place, and the old gas-fittings, suitable for 25 or 30 candle gas, were no longer capable of carrying the gas that was required to pass through them for modern lighting. He thought that all Gas Associations should do what was done by the North British Association a few years ago—have a table of fittings prepared, and the fittings required for the various numbers of lights, and the number of feet required from the last fitting, so that the gas-fitter should have no excuse for putting in the wrong sizes of piping. A difficulty which gas managers had in coming forward and suggesting various fittings was illustrated to him some years back by Mr. Foulger, of London. He asked Mr. Foulger whether he had ever considered the question of making his own gas-meters, and he said: "For goodness sake don't suggest that. The gas-meter has always been considered the greatest liar in creation, and surely, if a gas company were to make meters themselves, the public would at once turn round and say they had made the meter to suit themselves—certainly not the consumer." So that antipathy to the gas-meter was not dead, or was not a few years ago. As regarded suction plant, he not long since delivered a lecture upon this subject in which he pointed out a number of the different points that were causing extra cost above the mere figures which were laid down by the makers of suction plants, which had to be taken into consideration when comparing coal-gas with suction-gas plants. He had had experience of these. He made experiments with gas-engines 25 or 26 years ago, in their early days, and had been keeping very close observation upon them since. There was one point that must be noted, which was that a suction-gas engine or gas plant, of 40 H.P. and upwards, required a man constantly in attendance if continuous working were required during the eight or nine hours in which men were at work; and in most cases where there was a stoppage for breakfast or dinner, the engines had to be kept running, so as to ensure that they would start immediately the men returned to work. All this had to be added to the cost of the suction-gas plant and suction power work as compared with coal-gas plant. The question of the status of the gas engineer was one which he had been very pleased to see for the last two years was being recognized by what might be considered the higher authorities in the engineering world. It was only within the past few years that a gas engineer had been elected to the Council of the Institution of Civil Engineers; and that was the late Sir George Livesey. Although there had been a gas engineer on the list of suggested councillors sent out to the members, it was only a few years ago that the general body of the members considered that those engaged in the gas industry were sufficiently learned in engineering matters to be allowed to be represented upon the Council of that body. He thought the reason for this was largely due to the fact that the gas engineer had been inclined to run too much upon the rule-of-thumb, rather than study the underlying principles which governed the various structures he had to deal with. He wondered how many so-called gas engineers were able to work out the stresses of a hundredth part of the structures that they put up in their works. He did not suppose many could do it. They worked by rule-of-thumb, or went upon what had been done before. If they took the trouble to work out these stresses, and to work out the various principles of the apparatus they put up, they should be able to make considerable economies. He was brought up in the school of economy, under Sir George Livesey, who never spent a penny where a half-penny would be sufficient, and who never painted a gasholder where he could tar it. As regarded attendance at these meetings, he thought a principle he had seen adopted by a number of gas managers in Scotland was an excellent one. They got members of their Committee or directorate to attend the various meetings, and learn for themselves the advantages and amount of information to be gained at them. In this way, in several instances, the gas manager had a portion, if not the whole, of his expenses paid for him.

Mr. Enright, in reply, said that the only point really upon which controversy had arisen had been the prices to be charged to slot-meter consumers. He found that when the additional price was being put on, it was lost sight of altogether that it was only for lighting purposes that this price was being fixed. If this were not the case, why should they give reductions of 2s. 6d., 1s. 8d., 1s. 1d., 1s., or 9d. to ordinary consumers for cooking, and still add 4½d. or 5½d. to cookers with a slot meter? He was not very strong on the point that they could not sell gas at the ordinary price; but he was more convinced now than ever, notwithstanding the argument put forward against the price with regard to the extra cost of capital, that they could sell gas at the ordinary price to the prepayment consumer, when they took into consideration that it was sold to a consumer for cooking purposes for less. Mr. Tyndall said that he (Mr. Enright) assumed that everything over 2s. 1d. ought to go to them. He said no such thing. What he said was that the days of "take it or leave it" were over, and that they could not go to a probable consumer, and, after convincing him of the merits of gas, ask him to pay a higher price than his next-door neighbour was paying for the one purpose. If these arguments were so true against the additional charge upon the prepayment meter consumer, why were they not equally as true against differential rates for gas-engines? Why sell gas for 1s. 6d. or 2s. to those who used gas-engines, when they charged a lighting consumer 3s. 3d.? To his mind, this was a distinction without a difference. The other point to be remembered was that the slot consumers they got were reducing the manufacturing cost, and that this would tend, in the end, to reduce the cost to ordinary consumers. He thanked Mr. Tyndall for his other kind references to the paper. Mr. Saville considered it better for an official not to be under the Local Government Board; but the matter cut both ways. He thought they ought to have some security, or some body—the Local Government Board or other—whom they could look to for protection against their employers when they were in the right. Mr. Young referred to the grievances of managers. For his own part, he could not suggest anything definite by which these might be got over. He introduced the subject into his communication to make the paper a controversial one, and to get the managers' interests expressed. He thought they might have got some other ideas as to how to put their status in a more sound position. He thanked Mr. Dunn for his very kind references to the paper all through. His contribution to the discussion was more interesting than the paper. Mr. O'Connor asked him how he got the 8000 cubic feet he assumed for cooking purposes. He used a discount meter. He found that some people were burning 14,000 or 16,000 cubic feet, and using 9000 cubic feet for cooking.

The "Soleil d'Or" Lamp.

According to the "Ironmonger" (Aug. 14), the Société Française Auer have placed a lamp on the market under the above name which shows some points of interest. Its power amounts to 1300 candles, which is given with a consumption of 1000 litres of gas per hour (28 cubic feet approximately). Only one mantle is used; and this is of quite moderate proportions—the great illuminating effect being attained by means of very rapid combustion of the mixture of gas and air. The temperature attained is much higher than usual. It is stated that the illuminating power is increased five-fold for the same surface of incandescent material. The lamp is connected with the ordinary gas-main; the gas being supplied at the usual pressure. But the thorough mixing with the air is the result of the latter being supplied under pressure. Instead of having a system of high-pressure air-pipes, a small electrically-driven fan is placed under the burner; the air taken from the surrounding atmosphere being forced towards the burner. The electrical energy necessary for driving the fan is furnished by means of a thermopile placed in the lamp-chimney. A few seconds after lighting the lamp current flows to the motor, which is enclosed, and has a direct drive to the fan.

Out of a total sum of rather more than £26,000,000 which the Prefect of the Seine has proposed to the Municipal Council to spend on improvements in Paris, £4,700,000 will be devoted to water and sanitary works.

The Junior Institution of Engineers are holding their summer meeting this week in the Midlands. It opened at Leamington on Saturday with a welcome by the Mayor, Mr. Alfred Holt, J.P. To-morrow morning will be occupied with a visit to the Mechanical, Electrical, and Civil Engineering Departments of the Birmingham University; and on Thursday afternoon the members will inspect the new gas-works of the Coventry Corporation at Foleshill.

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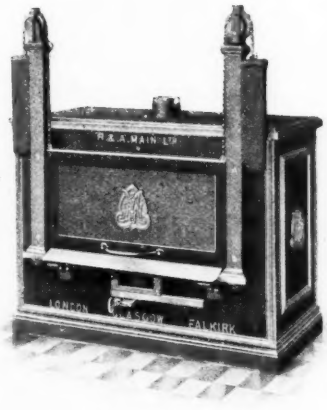

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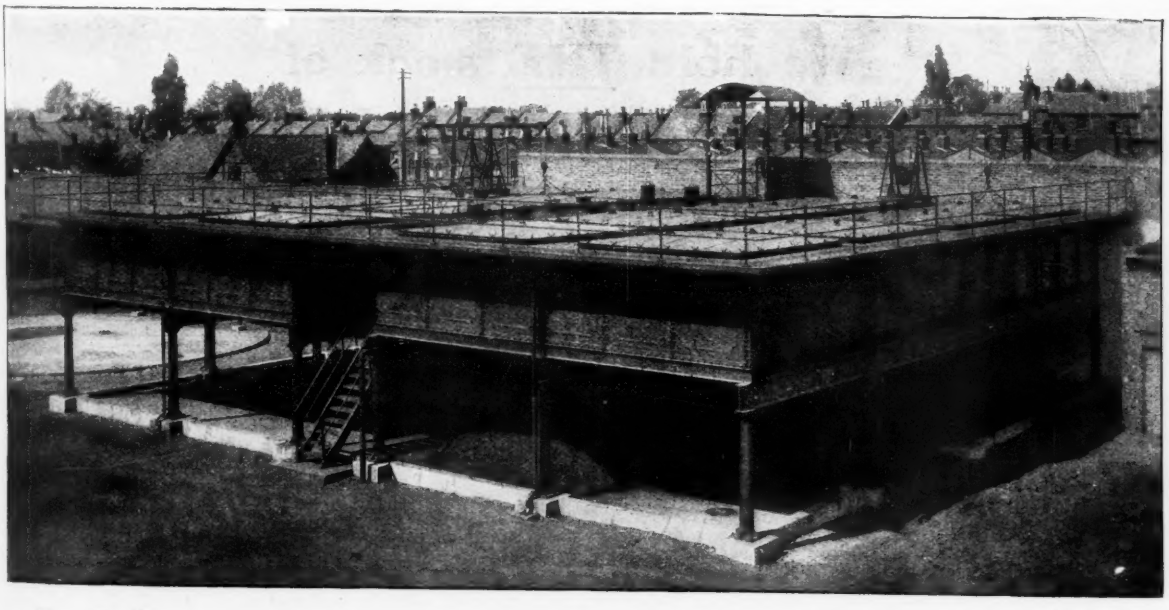

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[Extracts from a Paper read before the Association of Water Engineers.]

The Previous Source of Supply.

The Selby Urban District Council and their predecessors have always been the water authority for Selby; the first works having been installed in 1854. At this time a borehole, 330 feet deep and 6½ inches diameter, was put down; the site being situated in the town, but no doubt at the time not so hedged round by buildings as it is at present. The quantity of water pumped at the date in question was 243,000 gallons per day. The rest-level was stated to have been 16 ft. 6 in. above Ordnance datum; and, after pumping, it was restored in a period of two hours. In 1885, another borehole was sunk to a depth of 390 feet, being 12½ inches diameter. By the year 1893, the yield of this was only 7700 gallons per hour (184,800 gallons per day); and in the year following the borehole was deepened to 674 feet, after which the supply amounted to 250,000 gallons per day. The records show that during the period of 25 years, from 1875 to 1900, the rest-level of the water fell about 12 feet, and the pumping level fell from 12·39 feet to 21·62 feet below Ordnance datum. From the year 1895 to the year 1900, when the question of new works was again under consideration, the pumping level had declined 10 feet, and the demand was becoming perilously close to the supply.

The New Scheme.

In May, 1903, Mr. Griffith reported to the Council on the main features of the new works which by that time were admitted to be necessary. In this report, he supported advice given by Professor Kendall, that the works should be out of the town, and that the best site would be adjacent to Brayton Barff. He recommended a boring of such a size that, if on testing it was found to yield a sufficient supply, it could be utilized for the permanent pumps. If this proved not to be the case, a 12 feet diameter well, 150 feet deep, with a boring beyond this depth, was recommended.

The population to be supplied being 8400, and the increase during the previous two years having been 614, or 7·88 per cent., Mr. Griffith calculated upon the population reaching 14,000 within a period of ten years; and assuming that the new works would also have to supply the villages in the immediate neighbourhood, he added a further population of 2000 on this account—making a total of 16,000. Taking a consumption of 18 gallons per head per day for domestic purposes on this total, and 7 gallons per head per day for trade purposes on the urban population of 14,000, the total demand likely to come upon the new works worked out at 386,000 gallons per day. Allowing for pumping during twelve hours out of the twenty-four, the standard capacity of the pumping plant was taken as 32,000 gallons per hour.

The following is a brief summary of the work carried out, with the leading dimensions of the principal items.

Borings.—Each 400 feet deep. First 100 feet lined with cast-iron tubes 24 inches internal diameter; a further 100 feet open boring 24 inches in diameter; the remainder 15 inches diameter.

Boilers.—Paxman's "Economic" or "dry-back" type, 9 ft. 6 in. long, 6 feet diameter, flue-tube 3 feet diameter, smoke-tubes 2¾ inches diameter; heating surface, 393 square feet; evaporative capacity, 1960 lbs. of water per hour; grate area, 14·5 square feet; working pressure, 150 lbs. per square inch.

Engines.—Triple-expansion marine type, indicating 70 I.H.P. at 20 revolutions per minute; cylinders, 13 inches, 20 inches, and 34 inches diameter; stroke, 24 inches. Corliss valves and gear. Fly-wheels, 10 feet diameter, weighing 5 tons each. Maximum steam consumption guaranteed under the contract, 12·9 lbs. per I.H.P. per hour.

Force-Pumps.—Triple ram pumps, worked direct from the engine cross-heads, 11½ inches diameter and 24 inches stroke. Valves of rubber, 4¾ inches diameter.

Borehole Pumps.—These are operated direct (without gearing) by means of disc cranks overhanging the outer bearings, and connecting-rods working the top centres of "inverted tee" levers. The pumps are worked from the outside centres of the levers; the inner ones being fitted to carry the balance-weights. The pumps are fixed so that the bottom of the suction-pipes is in each case 200 feet below the surface of the ground; the rising mains, barrels, and suctions being suspended from the head boxes, which are specially designed for the purpose. The pump barrels are 16 inches in diameter, with 3 ft. 3 in. stroke, of gun-metal throughout. The pump suctions are extended sleeves or boxes of gun-metal fitted with a rubber valve. The buckets are of gun-metal; and although the valves are of the usual design, the castings are extended above the packed or wearing portion of the buckets, so that the discharge of water always takes place above the barrels—that is, in the rising main, which is 2 inches larger in diameter. The pump-rods are wrought-iron tubes 11 inches diameter, provided with "clam" joints of novel design to avoid the usual screwed ends and sockets. An arrangement is provided by which, on the upstroke of the pumps, communication is established between the underside of the buckets and the interior of the pump rods or tubes. The rising main is formed of steel tubes 18 inches diameter, jointed in the usual way. Outside the rising mains are ⅜-inch brass tubes, with open ends, fixed at 200 feet below the surface, by means of which the depth of water in the borings is registered on a pressure-gauge worked from a Worthington steam-driven air-pump.

Buildings.—The engine-house is provided with two domes central to the borings, constructed of reinforced concrete sufficiently strong to bear the weight of the pumps during removal or refixing; special tackle being provided for lifting the plant. The other portions of the machinery are commanded by a travelling crane. The same building includes feed-pump and heater house, boiler-house, coal-store, and workshop. There is also a cottage provided for the foreman in charge of the works.

Accessories.—The pumping-station is fitted throughout with electric light supplied from a small generating plant fixed in the workshop, and accumulators stored in a special annexe. The electric light engine also drives the workshop tools—lathe, drilling-machine, forge-blast, grindstone, &c.

Reservoir.—This is situated on the Barff, at such a level that the head of water available at Selby Market Place is 160 feet. The importance of this somewhat excessive head is explained by the disastrous fire which occurred at Selby's most interesting abbey church in 1906, when, owing to insufficient pressure in the mains, and delay in getting fire-engines into operation, damage was done which has involved an expenditure of £45,000 to repair. In future it will be possible to throw a jet of water almost to the ridge of this lofty roof without the use of a fire-engine. The capacity of the reservoir is 800,000 gallons, representing about three days' supply at the present rate of demand. It is constructed with 12 inches of concrete for floor, brick walls 1 ft. 10½ in. thick at the top and 4 ft. 2½ in. thick at the base, and concrete roof in arches of 7 feet span (centres), 6 inches thick at the crown. The excavation revealed a very excellent foundation of good homogeneous clay; and the only point which may suggest discussion is the use of bitumen sheeting. It may be at once admitted that the advantages of this as compared with cement rendering—including, of course, the question of cost—are not so marked as to warrant its adoption in all cases; but the authors are satisfied their choice was justified by the results obtained. The reservoir has proved perfectly water-tight, notwithstanding the fact that water was not put into it until some twelve months after it was completed, and that the cost—viz., £4791—works out at £5 19s. 9½d. per 1000 gallons of capacity.

It will be interesting to record one difficulty which occurred during the interval that the reservoir was waiting for the delivery of water from the new pumping-station. During a very wet season, the floor was found to have arched-up to the extent of 5 inches between the rows of piers, and it was feared that some serious defect must have been present to account for the phenomenon. On removing a brick, and pricking a small hole in the bitumen sheeting, a discharge of air or gas occurred (with little or no water), and the floor gradually settled down to its proper position. The sheeting was, of course, easily made good; and the reservoir has proved "bottle-tight" ever since it has been in use. Perhaps this rather peculiar occurrence may be explained in the course of the discussion; but in any event, it seemed worthy of record. The reservoir has a valve-house adjacent to it; and in one section of this is fixed the recording apparatus of a Venturi meter, which itself is fixed on the outlet or supply main to Selby.

Points of Special Interest.

Although it is hoped that what has already been written will not be devoid of interest, the authors propose to deal with some special points in connection with which they have gained experience such as may prove valuable to other members.

(1) *Testing Boreholes.*—In connection with the first borehole, the contract provided for a three weeks' continuous test by means of a steam-driven pump; and a large engine and pump (of the "concertina" type) were installed for the purpose. Many difficulties were met with in operating this plant. Several important parts had to be renewed, and much time was lost before a satisfactory test was obtained—and this notwithstanding the fact that there was no scarcity of water within a distance of 100 feet below the surface. On the completion of the second boring, the authors decided to test this by means of an air-lift plant; and this was dealt with as a separate contract, whereas the first test was included in the contract for driving the borehole. It was, however, possible to estimate the amount provided for the test in the tender for the first borehole, and thus to obtain a comparison of the cost of the two systems. Both tests, being under similar conditions except as regards length, the comparison will, therefore, be of value. The cost of a 21 days' continuous test with steam plant worked out at about £600, and a 14-days' test with air-lift plant at £300. Thus in every respect the latter system proved itself far superior; and the authors suggest that in all cases where sufficient immersion can be obtained below the normal pumping level, and also perhaps within some limits as regards the capacity of the plant, this method of testing boreholes may be accepted as preferable to any other.

(2) *Design of Borehole Pump.*—From the brief description already given, it will be seen that the pump is single-acting, and, therefore, requires to be balanced, not only as regards the dead-weight of the rods and bucket, but also as regards the work done on the up-and-down strokes respectively. The balancing of the rods is, of course, accomplished by counterweights suspended from the inner extremities of the "tee-bobs;" but the equalization of the work between the up-and-down strokes was accomplished by the less common method of carrying tubular rods (having an external displacement area equal to one-half that of the pump-buckets) down to the tops of the buckets. It may perhaps be worthy of discussion as to whether this method is superior to the more usual alternative of increasing proportionately the amount of the balance-weight.

Having provided borings of a considerable depth, in which the rest-level of the water was within 45 feet of the surface, it was decided to fix the pumps at such a depth that the available supply of water should not at any future time be exhausted. The test pumping had shown that the normal level of the water when being pumped at the required rate—viz., 32,000 gallons per hour—would not be more than 125 feet below the surface; but there appeared to be no practical objection to fixing the pumps to draw from a depth of 200 feet, which gave an immersion to the suction-valves of about 80 feet below the normal pumping level of the water.

(3) *Main Laying.*—One or two points of special interest may be mentioned in this connection. (*a*) The authors used flanged pipes for the rising main up the steep side of the Barff; and their experience proved that this was not an advantage, as the rigidity of the joints involved considerable difficulty in regard to the depth of the trench, and a good deal of cutting to make the final connections at each end of the pipe-line. (*b*) In the case of the delivery main, the joints were ordinary socket joints, but made with lead only. The only difficulty met with here was the necessity for pouring the lead in at a suitable temperature to prevent it melting the solid lead fillet, and running through into the pipe. (*c*) In some of the smaller branch connections, lead wool was used, and proved highly successful. (*d*) The whole of the new mains were tested to a pressure of 120 lbs. per square inch, laid and proved perfectly tight.

Working Costs.

The authors regret that, at the time of preparing this paper, they are not able to give detailed results as regards the working costs of pumping with the plant as described. It is intended, however, to make a proper test; and if the results are available in time, they will be added either as an appendix to the paper or in the form of "correspondence" in the Transactions. The average total cost appears, however, to be about 0·78d. per 1000 gallons pumped a vertical height of 210 feet.

Cost of the Works.

The following statement will be self-explanatory, and, the authors hope, useful to the members.

1. Cost of the Act	£3,986	10	0
2. Land, wayleaves, and special drain to lead water to canal during test pumping	1,968	17	6
3. Two borings and test pumping	2,751	13	11
4. Pumping machinery in duplicate, with electric light plant and all accessories	8,017	0	0
5. Building work at pumping station with cottage, road-making, fencing, and planting site with trees, &c.	4,684	5	5
6. Service reservoir, valve-house, Venturi meter, water-level recorder, and accessories	4,791	11	0
7. 12-inch rising main to reservoir and 10-inch delivery main to Selby	4,128	2	6
8. Telephone from town hall to pumping-station	119	13	2
9. Engineer's fees, expenses, and sundry special items not yet finally adjusted (say)	2,552	6	6
Total	£33,000	0	0

The expenditure authorized by the Act was £30,000, in addition to the cost of the Act; so that the Council still have about £1000 in reserve for future capital outlay on the works.

At the close of the paper, Mr. Griffith said he should like, with the President's consent, to invite discussion on a point not mentioned in the paper itself. This was upon the use of notched weirs for measuring the delivery of pumps. At Selby, he had arranged a rectangular notched weir, the discharge over which was registered by means of a float carrying a graduated vertical rod. The scale on this rod was plotted in accordance with the generally accepted formula, and when compared with measurements taken of the amount actually discharged into the reservoir, it was seen that there was some discrepancy; and in order to secure accurate readings, it had been found necessary to fix the cross wire, which was purposely made adjustable, so that when the water was level with the sill of the weir the wire was not exactly opposite the zero on the scale. He would, however, be glad if members would suggest some reason for this discrepancy, as he had found a similar inaccuracy occur in the case of a V notch used in the same way.

Discussion.

The President expressed the hope that there would be a free discussion of the paper, in which, he said, so many points had been raised. It was more particularly interesting to engineers who had pumping schemes to attend to.

Mr. H. Ashton Hill (South Staffordshire Water Company) said the paper read by Mr. Griffith was a very useful one. The first note he had made was on the large bore. He wondered why, in 1885, they did not make a larger borehole than a 12½-inch. If they had done so, it might have been unnecessary to have called in Mr. Griffith. The next question he had noted was the lining of the borehole 100 feet down. Mr. Griffith told them that the site of the pumping-station was an ideal one, and that there was no chance of pollution. Now, probably a large portion of this 100 feet would contribute a considerable amount of water; and he should like to know what determined Mr. Griffith to line the borehole to so great a depth as 100 feet, thus excluding the water. With regard to the borehole pumps, he should like to ask if any difficulty had been experienced in the working of the engines from the overhanging of the disc-cranks on the outer bearings, and whether the engines had worked smoothly. With respect to the bitumen sheeting in the reservoir, if this were in the new red sandstone he did not know where the gas could come from; and he should be inclined to say it was air, forced up by water, under pressure from higher ground. The question as to the different methods of testing the yield was the next point he had noted. There was not very much difference. He reckoned that the great advantage was in the convenience of the air-lift. They were in some cases able to pump more water, and to put down a larger plant at much less cost.

Mr. A. Towler (Leeds) said it seemed rather singular that the makers of the plant were only asked to give for it a guarantee per indicated horse power. He should have thought that an experienced engineer would have asked for a guarantee which would have included the efficiency of the engines and pumps.

Mr. William Matthews (London) said that at the end of the paper Mr. Griffith had—very properly, he considered—admitted that the working costs, so far as he had been able

to ascertain, were very high indeed. Going still farther back (he himself was working backwards in his argument), as Mr. Towler had pointed out, they had only the duty of the engines considered as indicated horse power. He thought the reason for the total cost being so high was probably due, not to the fact that the engine itself might not be a perfectly economical one, but to the type of pump adopted, as it was next to impossible, with its design, to get anything like a reasonable percentage of efficiency from it. This was proved by some of the difficulties which Mr. Griffith suggested had arisen. If they turned to the details of the borehole pump and the pump suction, it was not difficult to see where the low efficiency of this particular pump came in; and he was convinced that Mr. Griffith would find in time that the pump efficiency was exceedingly low in this case. They were told that at the outset difficulties arose with the pump-valves. This was exactly what he would have anticipated would happen. These valves were put in on the side of the inner portion; so that they were not dropping valves, but were opening and closing at right angles to the exhaust of the pump. With regard to the reservoir, it was very costly relative to other reservoirs which had been constructed; and he was rather inclined to think this was due to a depth of only 10 ft. 6 in. of water having been adopted. This was not at all an economical depth for a covered service reservoir. To get the best results, a depth of 15 or 16 feet was required. Neither did he like the idea of bitumen sheeting, unless the authors were obliged to put it in. At the best it was a perishable material; and it could not possibly last so long as the rest of the work. The authors spoke of using a notched weir for the purposes of temporary gaugings. He thought there was a difficulty in using such weirs, because it was next to impossible to get temporary gaugings arranged so that they could obtain a proper estimate of the velocity of approach.

Mr. Easton Devonshire (London) desired to refer to the cost of the reservoir described by the authors. As he had pointed out on similar occasions during the past few years, the cost of construction of reinforced concrete reservoirs of which he had experience compared very favourably with that of solid concrete or masonry reservoirs which it was still the practice to build in England, where practical knowledge of reinforced concrete construction was not advanced. The covered reservoir built for his Company at Antwerp a few years ago corresponded in depth with the Selby reservoir; but its cost per million gallons was one-half that given by the authors, though it was fair to add that its capacity was about 50 per cent. greater. With regard to the estimated working cost of the engines and pumps given in the paper, the figures he had jotted down from memory as to the cost of pumping at the two stations of the South Hants Water-Works certainly bore out Mr. Matthews' contention as to the high cost of working of borehole pumps as compared with well pumps for moderate lifts.

Mr. Charles Hawksley (London) said he did not know whether the reduction of 12 feet in the rest-level of the water was intended to be 12 feet in addition to the 9 feet previously mentioned by the authors, or whether it meant 12 feet in all. The estimated consumption of 18 gallons of water per head per diem for domestic purposes, for which provision had been made, was, in his opinion, very ample; and he should think that, in a town like Selby, with good management and the waste well looked after, it would be found to amount to less than 18 gallons—probably 14 gallons at most—per head per day. The steam consumption was stated to be guaranteed at 12·9 lbs. per indicated horse power. He did not know whether this had been proved to be the consumption on trial; but supposing it to be the guaranteed consumption, the trial showed that the anticipations formed had been realized. If a trial had been made, perhaps Mr. Griffith would tell them what had been the outcome. With regard to the notch gauge, was it not possible that the apparent difference between the results as measured at the reservoir and those ascertained by calculation was due to the recording apparatus, if such an apparatus was used? With it, there was always a certain amount of friction; and unless the float was of considerable diameter, there was always a difference between its immersion when it was going upwards and when it was going downwards. This, of course, would make a difference. With regard to the uplift of the bottom of the reservoir, it was stated in the paper that the foundations were of good homogeneous clay, and it would appear to him that it was most probable that water found its way, perhaps in small quantities, between the bottom of the reservoir and the clay forming the foundation. In that case there would be an uplift, due to the head from which the water was derived; and though it was stated that little water was found, and that it was mostly air which escaped, that air was probably under the pressure of the water, and therefore the uplift was due to the same cause—namely, the water under the floor. If this were the explanation, it would be likely to recur whenever the reservoir became empty or nearly so, and there happened to be a similar pressure of water under the floor. Therefore he should think it would be advisable to make provision for the release of the water.

Mr. H. E. Stilgoe (Birmingham), referring to the compensation to be given to owners of wells depleted by the new works, said that perhaps Mr. Griffith would tell the members whether the clauses in the Selby Act bearing upon this matter were put in by arrangement, or whether they were forced upon the promoters.

Mr. F. W. Hodson (Loughborough) said the clauses giving owners of wells within 2½ miles compensation, either in money or in water, or by improving the supply at the depleted well, were forced upon Selby by the opponents of the scheme. He should like to ask Mr. Griffith to be good enough to give them some information as to what had been the effect of these clauses on the undertaking. Another point was with respect to a free supply of water from the mains as compensation to a depleted well. The free supply involved some injustice to the authority, because it gave so much more than was taken away. Not only was the quality better, but the quantity used was vastly increased, and all cost of drawing water and the maintenance of wells and pumps ceased; and there was no doubt that the mere fact of putting in the public water supply was a material advantage to the owner of a shallow well.

Mr. E. Sandeman (Bamford) said, with regard to the reservoir, he agreed with Mr. Hawksley's ideas. He had had two cases, and there was another within his knowledge, where water had penetrated beneath asphalt, and raised it perhaps 5 or 6 inches from its concrete bed. Probably in the case of Selby it was also caused by water acting in the way Mr. Hawksley had described. A very interesting point came out with regard to the air-pipe in the borehole. He believed Mr. Griffith used compressed air for raising water out of the borehole, and he should like to know what were the best proportions of the pipe under water compared with the pipe out of water.

Mr. Charles Hawksley, speaking of the provisions for dealing with depleted wells, pointed out that it was required that the owners of the public supply should make good any deficiency which was actually proved to exist in the supply within a certain distance of the well. It might be of interest to the Association to know that, in the form in which it stood, the clause provided that public water suppliers should make good the deficiency in such a way that the cost to the owner of the private well for obtaining water should not be greater than it had been previously. There was also power given to the water authority to have access to the well of any person who might thereafter intend to allege that his well had been depleted, or that his private supply had been lessened; and this power enabled the water authority to make observations from year to year of the height of water in any such private wells, and therefore to prepare themselves for eventualities, and to show probably that the loss of water had been due to natural causes, and not to pumping at the well of the water authority.

Mr. H. Ashton Hill said he should like, with permission, to make a few further remarks. He did not think the paper should pass without reference by him to a point which had been raised by some of the speakers, as to the probable reason of the costly character of the pumping machinery being due to the fact that the pumps were in boreholes and not in wells. He thought that in his paper of last year he indicated certain reasons why it might be preferable in one case to put down a borehole, and in another to sink a well. He thought that people who had had more experience of either a borehole or a well were very much inclined to say that either the one or the other was best, according as they had found it. He heard one say, after having had experience with a borehole: "No more wells for me." This was a mistake, because he knew instances in which wells had been sunk and headings driven where they could not put down boreholes to obtain the same yield. Before the meeting concluded, he intended to bring before the members a case of his own, in which they had an installation that was

pumping water from two boreholes in fairly good quantities. They raised 2 million gallons per day; and he was going to submit that he was pumping water from these boreholes more cheaply than anything that was shown in the figures given in this paper or in the one on suction gas, &c.* He was not going to say this was because the pumps were in boreholes; but it did go to show that they must not condemn borehole plant which, as he had mentioned, was pumping 2 million gallons a day, and doing it so efficiently and with such economy. No difficulty whatever was being experienced with regard to borehole pumps. He had had them working for many years without the slightest hitch or trouble whatever. He thought it only right that the other side of the question should be put, so that members might not be misled.

Mr. C. Clemesha Smith (Wakefield) followed with some remarks on the question of the supply of water to districts outside the parliamentary area by large water authorities, and gave the results of his ten or twelve years' experience of the difficulties of such supply.

Mr. J. Shaw (Boston), a former member of the Association, obtained permission to ask whether one reason for the small economy of the plant was not the fact that the buckets of the borehole pumps were too far underneath the water. With regard to "boreholes *versus* wells," as a general rule, in the new red sandstone, if he had the designing of any work, he should put down a borehole, because in that formation the water level generally decreased in two or three years; and if they went on lowering their pumps, following the water down, it was much more easily done in a borehole than if they had to sink a well farther. The authors might have told them of the difficult nature of the ground where the reservoir was placed. So far as could be seen, the site was on a hill, and all the material had to be dragged 150 or 160 feet up it. He had no doubt that a line of railway would have had to be constructed, in order to get the materials up to the place; and it would be much more expensive to convey the materials up to the reservoir than to build it in a flat country, or where the site was easily accessible. In regard to the air or gas that was underneath the reservoir, the bottom would be at least 150 or 160 feet above the normal water level in the new red sandstone, so that the air could not have come out from this particular point. He should suggest that as the footings of the walls would be a little lower than the main body of the reservoir, there was a hollow in which air had accumulated below the floor, and that when rain fell on the covering of the reservoir the water ran down the outside of the walls, and drove the air underneath the floor, and thus caused the pressure.

Mr. Percy Griffith, in replying to the discussion, said Mr. Ashton Hill had asked why the boring was not made larger in diameter; but, with the results obtained, he (Mr. Griffith) felt confident any such increase would have been an unnecessary extravagance. With regard to the working costs per 1000 gallons of water pumped, the figure given in the paper was a very approximate one, and did not represent the results of normal working. It included, for example, the wages of two men whose time was not nearly fully occupied (an item which represented half the total cost of pumping); and, further, it was obtained at a time when the pumps were working very inefficiently. Certain alterations were now being carried out in some points of detail, and a further test would be made when these were completed. The results would be communicated to the members in due course, and he felt confident they would compare favourably with those obtained by them in other cases. A test had been made to prove the duty of the engines alone, and the full duty guaranteed by the makers had been realized; so that when the pumps were working efficiently there was every prospect of a very satisfactory result being secured. In regard to the general working of the borehole pumps, he had to confess that at the present moment one pump was working much more steadily than the other, and that some difficulty had been met with in connection with the overhanging disc referred to in the discussion. All the difficulties that had been met with were, however, being overcome; and he saw no reason to regret any part of the design he had adopted. He was, however, quite prepared for members to suggest that it could be improved upon, as one generally felt that one could improve upon the work carried out by someone else. He wished particularly to thank Mr. Ashton Hill for his second speech, dealing with the relative value of boreholes as compared with wells. He (Mr. Griffith) was not at all prepared to accept the opinion that the extra cost of a well would have been covered by the greater economy of well pumps compared with borehole pumps.

Mr. Matthews remarked that he had referred to cases where pumps were fixed within a depth of 200 feet from the surface; and he agreed that at greater depths the same argument would not necessarily apply.

Mr. Griffith accepted this reservation, but added that he could not accept the opinion even limited to pumps within a total depth of 200 feet. He wished to express his appreciation of the presence and interest of Mr. Charles Hawksley, and regretted that, in Mr. Gray's absence, he could not answer his first question as to the fall of the water level in the boring at the old works. With respect to the domestic consumption provided for, the figure of 18 gallons per head per day was the known consumption at the time the new works were designed, and was no doubt due to the existence of some old mains laid more than fifty years ago. Any economy which might be made in this direction (by the prevention of waste) would, of course, be to the advantage of the new plant in reducing the hours of pumping, and in lengthening the period during which the works would maintain the supply. He could quite accept Mr. Hawksley's suggestion that the discrepancy in the readings of the weir gauge was due to friction in the working of the float and rod, though every precaution had been taken to avoid the difficulty. In this connection, he was grateful to Mr. Matthews for his suggestion as to the use of submerged circular orifices in place of notched weirs. He had considered this point, but had found some difficulty in applying the principle in this particular case. In regard to the lifting of the reservoir floor, he would explain that the bitumen sheeting, with its brick-on-edge covering, was laid on a solid bed of concrete 12 inches thick. This concrete was particularly well laid, and was, he believed, impervious to air or water, so that air could not have got underneath the sheeting except through the base of the brick walls; so he accepted Mr. Shaw's suggestion that this had been probably caused by saturation of the surface soil, which imprisoned the air, and ultimately acquired sufficient pressure to force it between the concrete and the bitumen sheeting. On the very important question raised as to the depletion of adjacent wells, he was pleased to say that, so far, there had been no case of it at Selby, which proved that the water passed freely through the sandstone; and the effect of pumping was limited to a very restricted area. In this connection, he wished to refer to the conditions which would have prevailed if they had sunk a well instead of a boring. In the case of two other works similarly situated to those at Selby, this had been done, with the result that in the course of a few years the pumping level of the water had been lowered to such an extent that the supply could not be maintained except by driving extensive headings and additional boreholes, which was work involving far greater expenditure than the simple alternative of lowering the pumps—a course which could be adopted in a borehole and not in a well. The driving of headings also involved the depletion of the water over a much larger area; and had this course been adopted at Selby, there would no doubt have been very heavy claims from owners of neighbouring wells. With respect to the design of the pumps, he welcomed the criticisms that had been offered, though he could not accept the suggestion that the design adopted was essentially faulty; but he particularly wished to remove the impression that the pumps were in any sense a failure. The amount of slip was now quite within the limits of ordinary practice; and, in the one case, the working was very steady and uniform. Under such circumstances, he did not think that any fault could be found with the arrangement of the suction-valves. With "Dermatine" valves and stronger springs, these valves were always working in a perfectly satisfactory manner. In the case of a test plant, it was not necessary to go very closely into theoretical calculations as to the diameter and depth of the air and water tubes respectively, at any rate so long as the plant accomplished the end in view—viz., gave the required quantity of water during the test. Where such plants were used for permanent pumping, he agreed that the calculations should be made with the utmost care, in order to secure reasonably economical results. Speaking generally, he thought that the air-pipes required to be immersed below the pumping level of the water to a depth approximately equal to the height the water was lifted; but he believed the evidence on this point was very incomplete, and unreliable.

* See "Journal" for June 15, p. 727.

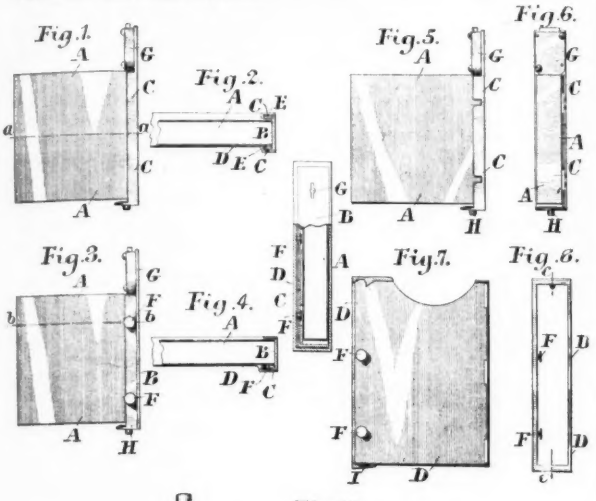
REGISTER OF PATENTS.

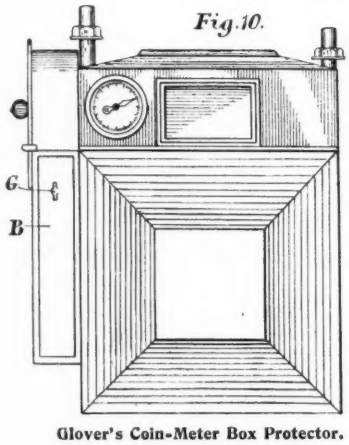
Protecting the Drawers of Coin-Meters.

GLOVER, T., of Norwich.

No. 3768; Feb. 19, 1908.

The patentee proposes to construct money receptacles, or drawers and frames for same, of coin-freed and other apparatus with slotted lips on the frame and headed studs on the drawer (or headed studs on the frame and slotted lips on the drawer), so that when the drawer is in position in the frame, the slotted lips engage the headed studs and hold the drawer and frame together.





Glover's Coin-Meter Box Protector.

As shown in fig. 1 (a side elevation of the drawer) and fig. 2 (section on line *a*), the front of the drawer A, or a frame B connected thereto, is formed with backwardly projecting lip C, or lips on both sides; and on the sides of the frame D or apparatus enclosing and next to the drawer there is also formed a lip E, or lips on both sides, extending in the opposite direction. Or, as in fig. 3 (side elevation of drawer) and fig. 4 (section on line *b*), headed studs F on the drawer A, and slotted lips C on the frame D, or, as in fig. 5 (side elevation of frame), fig. 6 (end elevation), fig. 7 (longitudinal section on line *c* of fig. 8, which is a front view of the frame D), and fig. 9 (which is a part sectional front elevation of both drawer and frame), it may be headed studs F on the frame D, and slotted lips C on the drawer A—but always in such a manner that, when the drawer is pushed home, the lip or lips (slotted or not) or the headed studs F engage the headed studs or the lip or lips of the walls of the casing enclosing the drawer, and so connect the walls of the casing and the drawer firmly together, and prevent a chisel or like instrument forcing the side walls of the casing away from the drawer. Fig. 10 is a side elevation of a meter with the drawer and its frame in position, and secured to the side of the meter.

The front wall of the drawer carries the lock G, and the patentee prefers to form the bottom of the wall with a stud H, which, when the drawer is being placed in position, is situate in a hole I (fig. 7), and when the drawer is pushed fully home or in the vertical position, and the bolt of the lock projected, the drawer will be held firmly in the casing top and bottom, as well as at the sides.

Gas-Stoves.

MAYNARD, G., of East Ham, and VENESS, G. T., of Wanstead, Essex.

No. 12,345; Dec. 7, 1908.

This invention has for its object "the provision of means whereby the heat from the gas is conserved and transmitted to the article to be heated in a more economical and efficient manner than has obtained in the past;" and it consists in arranging the burners in relation to the hot-plate or other device supporting the receptacle to be heated in such a way that the relative distance between the burner and receptacle is varied automatically in conjunction with the supply of gas, so that when the gas is "full on" the burner occupies its lowest position, and when the minimum of gas is being burned it occupies its highest position relative to the hot-plate. This arranging of burners in relation to the hot-plate may, however, be varied at the will of the user, irrespective of the quantity of gas passing through the gas-supply cock.

Gas-Generators.

JABS, A., of Zurich, Switzerland.

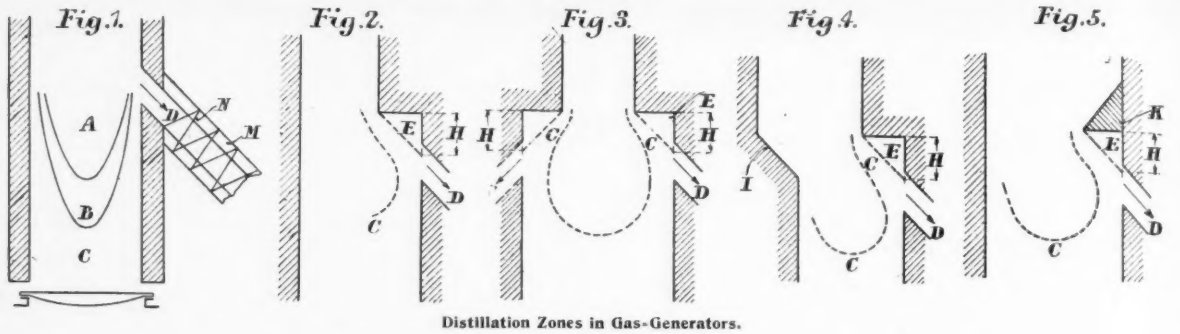
No. 12,446; June 9, 1908.

This invention (the patentee points out) is based upon the fact that in a generator are three zones. In the first or upper zone the freshly-charged fuel is heated and dried. In the second or central zone it is further heated and distilled; a distillation of tar, lighting gas, &c., occurring simultaneously, and terminating practically when, in the case of coal, the temperature rises to about 700° to 800° C., and thus converts the coal into coke. The coke sinks into the lowest or third zone in which it burns—that is to say, is oxidized with the admission of the oxygen of the air to carbon dioxide; and if the temperature is sufficiently high, it is reduced to carbon monoxide. The generator or coke gases produced during this heat-generating process leave the lowest zone at approximately 800° C.; develop, by giving off heat in the central zone, the products of distillation of the fuel; and, by intermingling with same, form a mixture of gases, the temperature of which, when leaving the upper zone, is about 500° C., but when the fuel contains a great deal of moisture considerably lower. The heat, which, when the outlet temperature of the mixture of gases is 500° C. amounts to about 10 per cent. of the energy of the coals, is mostly wasted if the gas is conveyed further for heating purposes or cooled for explosion engines, and the high average temperature of $(800 + 500) \div 2 = 650°$ C. in the upper zones of the generator is not favourable to the formation of valuable bye-products, as they become decomposed into inferior products. Thus, for instance, the tar is further dissociated at a higher temperature and decomposed into less valuable compounds rich in hydrogen and hydrocarbons; and the ammonia is decomposed at higher temperatures into nitrogen and hydrogen. In the distillation of peat, the methyl alcohol dissociates at temperatures exceeding 300° to 400° C. The usual method of working generators is, therefore, unsuitable for giving a higher output in bye-products. For the purposes of heating, another objectionable feature is the high percentage of nitrogen, amounting to 50 to 55 per cent. of the mixture of gases, as the nitrogen reduces the temperature of combustion in proportion to its heat absorption.

This invention obviates (it is said) the disadvantage of having the gases leaving the producer at a high temperature inherent to the method of working just described, on the basis of the discovery that the high temperature of the mixture of gases is chiefly due to the fact that the decomposition heat absorbed in the central distillation zone is much smaller than that developed by the combustion of coke in the lowest zone. If, however, only a portion (preferably half) of the coke is burned, and the other portion is laterally withdrawn from the generator at a point near the upper limit of the lowest zone—this being preferably effected at about one metre above the grate, where a temperature of about 700° to 800° C. exists—only half of the quantity of hot gases formed during the combustion of the coke will pass into the distillation zone, because a combustion layer of incandescent coke of 60 to 70 cm. is sufficient for reducing the carbon dioxide to carbon monoxide. As, however, the whole quantity of coals is distilled here to coke—that is to say, the same amount of heat is absorbed as hitherto—the quantity of hot gases above referred to, and now reduced to one-half the previous amount, must still give off in the distillation zone the same amount of heat that was given off there previously by twice the amount of hot gases. The temperature of the coke gases in the mixture of gases will be consequently reduced not only as before to 800° to 300° = 500° C., but twice as much—that is to say, to $800° - 2 \times 300° = 200°$ C. One kilo. of coal gives 0·3 cubic metre of lighting gas, the heating power of which is 4600 units per cubic metre, and 3·9 cubic metres of generator gas of a heating power of 1100 units. Therefore a mixture of gas of $\frac{0{\cdot}3 \times 4600 + 3{\cdot}9 \times 1100}{4{\cdot}2} = 1350$ is the heating value in heat units per cubic metre. As about half the produced coke is discharged laterally, and only the other half burnt up and transformed into gases, the mixture of gases will therefore contain not 13 cubic metres of coke gas to 1 cubic metre of lighting gas, but perhaps only 7 cubic metres of coke gas. The heating value in this case, instead of only 1350 units as before, would then amount to $\frac{7 \times 1100 + 1 \times 4600}{8} = 1540$ heat units. The bye-products of the distillation (tar oils, ammonia, &c.) will, moreover, be in a much more valuable state when contained in only 8 cubic metres of gas of a temperature of only 200° C.; so that their extraction will be correspondingly more profitable.

Through this working at a lower average temperature than usual, the tar will contain a much larger proportion of ingredients with low boiling point than that obtained by the ordinary process suitable for the high temperature of 500° C. The portions of the tar having a high boiling point will be condensed in the upper and less hot portion of the distillation zone, and will impregnate the partly-distilled coal, or the coke formed thereby, that is situated in this portion of the zone. If the coke thus impregnated sinks down into hotter parts of the distillation zone together with the charge, a fractional distillation and decomposition of the tar contained in the coke will take place. CH_4 and H_2 are evolved, and the remaining carbon or all the hydrocarbons having a high boiling point fill up the pores of the coke and combine with it, so that a solid, hard coke is produced. The heat required for distilling the fuels is not generally known. The applicant has calculated the distillation heat for 1 kilo. of Saar district coals at about 300 heat units; for peat substances, the heat was found to be at the outside 120 heat units. When applied to peat, the method described would, therefore, give comparatively more coke as a bye-product than when applied to ordinary coals.

It has been found that the lateral discharge of a portion of the charge in generators having shafts of equal cross-section in all zones does not



Distillation Zones in Gas-Generators.

give a satisfactory result, because, instead of completely distilled fuel —*i.e.*, fuel from which no more gas can be extracted at the temperature existing in the distillation zone, about 700° to 800° C.—only a mixture of fresh fuel, partly distilled fuel, and completely distilled fuel, could be discharged. The object desired is not therefore attained. No method hitherto used has, it is said, given a satisfactory result, as the behaviour of the descending charge and the progress of distillation in any given cross-section were not properly understood. Therefore, the circumstances were not taken into account. Owing to the friction between the descending charge and the walls of the shaft, the fuel is loosened, and, consequently, the rising hot generator gases, which, by giving off heat direct to the fuel, bring about distillation, encounter resistance on the walls which becomes smaller in proportion as they rise between them. The coking progresses, therefore, at the circumference to a much greater extent; and the distribution of fuel in a shaft generator is, consequently, such (as shown in fig. 1) that in the zone C is coke, in the zone B dried fuel which is being distilled, and in the zone A moist fuel which is being dried. If, however, the coke is withdrawn through an inclined tube D, not only coke from the zone C, but also dried fuel from the zone B and moist fuel from the zone A, will escape, as the zone C has only a small depth as measured inwardly from the wall of the generator towards the centre. It is therefore necessary to make such arrangements that only completely distilled fuel should be able to pass into the outlet pipe D.

The shaft generator constructions shown in partial section in figs. 2, 3, 4, and 5 fulfil the above condition. The essential point is that above the outlet pipe D there is produced, by means of a projecting arch or by an enlargement of the cross section of the upper portion of the shaft, a natural slope of the fuel, so that the zone C assumes at the sides the shape shown dotted.

As the thickness of the layer at the discharge or outlet pipe is smaller than in the centre of the combustion chamber, and as, owing to the enlargement of the cross section of the generator, the lower mass in the slope is loosened, the mass at the surface of the slope will be distilled very quickly; so that only completely distilled fuel will pass into the discharge pipe D. The applicant utilizes for this purpose the great deviations of the limiting surfaces of the zone from the horizontal plane shown in the vertical sections in figs. 1 to 5, and the reduction of the depth of layer corresponding to the increase of the limiting surfaces —namely, by widening the cross section of the generator in the coking zone (as in figs. 2 and 3) in such shape that the coke descending from the upper portion of the generator forms a slope which produces in the cross section of the coke discharge pipe D an increase or thickening of the lowest zone C in which the coke is burnt, and at the same time forms a free surface from which the gases will escape into the chamber or space E, having the height H, from which they are discharged in a suitable manner, and therefore, as intended, completely distilled fuel is discharged from the generator through the outlet pipe D.

Though of different construction, the devices I in fig. 4, and K in fig. 5, act in a similar manner; the devices forming a chamber E above the mouth of the coke outlet pipe D, and the chamber keeping free for the descending coke a slope, for the free escape of gases into the chamber E, and enabling only completely distilled fuel to be withdrawn from the generator through the pipe D as intended. For the purpose of cooling the coke laterally discharged from the generator (through the pipe D figs. 1 to 5), a casing or jacket M is used (fig. 1), preferably with a helical baffle N, through which cooling liquid or cooling air is passed; the heat absorbed by the helical tubes being utilized for feeding boilers, or heating the air for supplying the generator.

Inclined Purifier Grids.

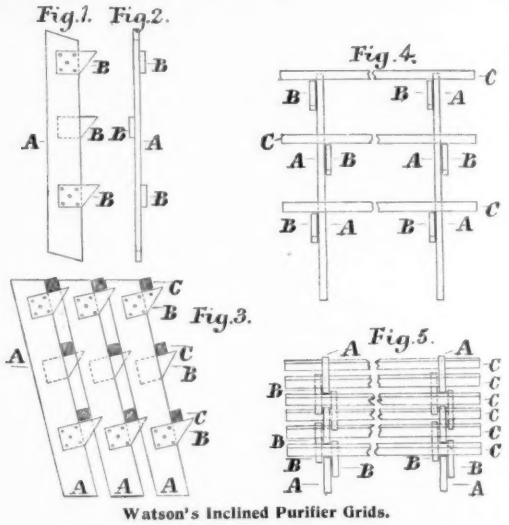
Watson, C., of York.

No. 17,296; Aug. 18, 1908.

The illustration shows a form of these improvements, and the way in which the grids are fitted together in the purifier-boxes.

The apparatus involved consists in reality of two distinct parts only —the carrier or bearer or support and a crossbar. The shape of the carrier is an elongated rhomboid of any thickness; the ends being at such an angle with the sides that, when standing on one end upon a flat or level surface, such as the ordinary bottom flat grid of a purifier, the carrier leans at an angle. On one edge of the carrier are a number of projections (to form supports for the crossbars and to engage with the carrier next in front) attached to the body of the carrier in such a position that an angle or hollow is formed on the upper side of the projection into which the crossbars fit and rest upon the projections, supported by the carriers.

In placing the carriers in a purifier-box, they are spaced such a distance apart that the crossbars, when laid on the projections, sustain the weight of oxide laid upon them. The number of projections and the corresponding crossbars required, depends upon the depth of material to be used. After placing the two or more carriers in position, two or more crossbars are laid upon the projections, and the next set of carriers placed in front and the crossbars put upon them, and so on to the end as required. The bars, when placed in position, form oblique rows; each centre bar breaking joint with the bars above and below it. When the grids are fitted in, the box can be filled by throwing or tipping material from the top; and the box can be emptied in a similar way from any side or from the centre.



Watson's Inclined Purifier Grids.

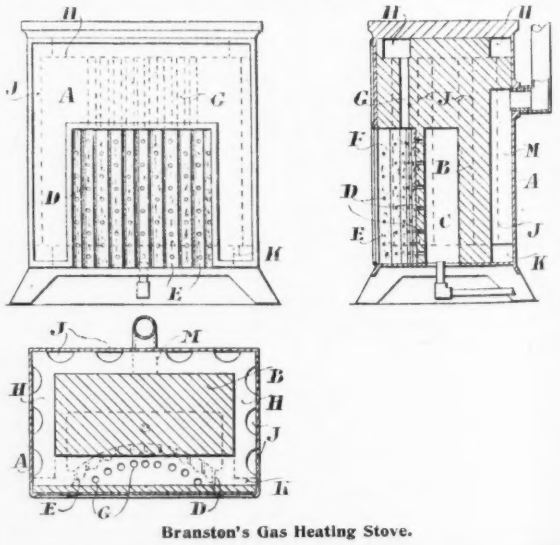
Fig. 1 is a side view, and fig. 2 a back edge view of a single support or carrier. Fig. 3 is the end elevation of a series of carriers A placed in front of each other with the locking projections, in the form of cleats B, nailed on alternate sides, and showing sectionally the crossbars C in their positions at the angles made by the projections with the edges of the carriers. It also shows how the crossbars form oblique rows, and how they break joint in their vertical planes. Fig. 4 is the front side elevation, and shows the relative positions of the carriers and the crossbars. Fig. 5 is a plan showing how this arrangement of carriers and bars forms tiers of grids.

Gas Heating Stoves.

Branston, F. R. E., of Chipstead, Surrey.

No. 15,621; July 23, 1908.

This invention has for its object to provide means for heating the chamber, in which the gas and air are mixed before ignition, by the



Branston's Gas Heating Stove.

products of combustion, "for the purpose of effecting a more complete mixture of the gas and air, more complete combustion, and greater

efficiency and economy in use, together with important hygienic advantages."

In the metal casing A is a fire-clay block B, having a cavity C. D are horizontal perforations, leading therefrom and passing into vertical grooves E in the front of the block (which is recessed). On the face of the block is disposed asbestos or other incandescent material. G are perforations leading into a chamber H (between the block and the top of the casing) extending to the side and back of the stove; and J are flues leading to the chamber K at the bottom of the stove. M is a flue leading from the chamber K to the flue-pipe.

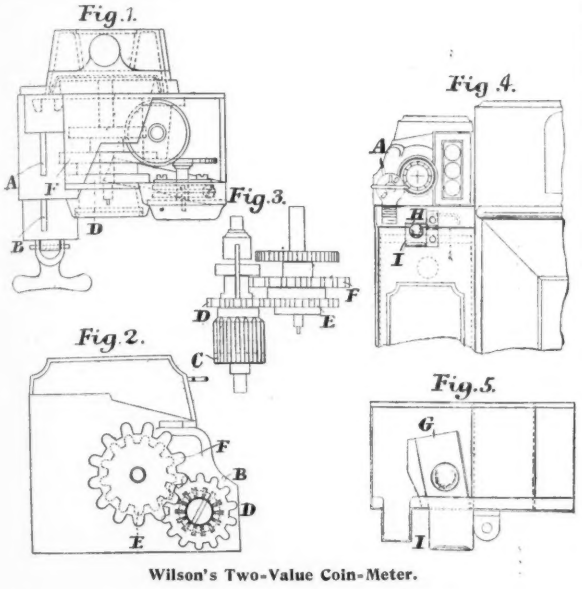
In operation, air and gas in proper proportions for combustion are admitted into the chamber C, where they are heated and allowed to expand "so that a thorough mixture of gas and air at one temperature and one pressure is obtained." The mixture passes through the horizontal holes D, and burns as it issues therefrom. The flames are guided within the grooves and heat the asbestos facing; the products of combustion passing up through the tubes G into the chamber H, down through the flues J into the lower chamber K, and up through the flue M to the flue pipe.

Coin-Freed Gas-Meters.

Wilson, G., of 's-Gravenhage, Holland.

No. 109; Jan. 2, 1909.

This invention relates to coin-freed gas-meters in which a device is provided whereby the mechanism which controls the supply of gas is actuated to different degrees according to the value of the coin inserted, whether to actuate directly a toothed wheel or other transmission device, or to connect with its carrier another device (normally loose on the carrier) capable of actuating the toothed wheel, which, in turn, actuates the usual mechanism.



Wilson's Two-Value Coin-Meter.

Fig. 1 is a top plan view of the casing containing the device. Fig. 2 shows a side elevation of the interior mechanism. Fig. 3 is a top plan view of same. Fig. 4 is a front elevation showing the invention applied to a gas-meter. Fig. 5 is a horizontal section of fig. 4, showing the shoot for the return of misplaced coins.

The casing which contains the mechanism has two slots. A slot serves to insert penny pieces or the like; while B slot serves to insert (say) sixpenny pieces. Journalled below the slots, and within the casing, is a spindle, the outer end of which is provided with an operating handle. Two longitudinal slots extend diametrically through the spindle, with inclined walls to prevent the pieces of money dropping through. Loosely arranged on the part of the spindle in which one of the slots is provided, is a drum C provided with radially extending slots and made with a toothed pinion D, meshing with a toothed wheel E made one with or attached to another toothed wheel F.

The various parts are arranged so that the drum C is below the slot B of the casing, while one slot of the spindle is below the slot A. If, now, a penny is inserted into the slot and the handle is rotated through a complete or half-revolution, the money retained in the slot and projecting from the spindle meshes with, and rotates, the toothed wheel F one tooth (the drum C being moved the same distance), whereupon the penny drops into a suitable receptacle (fig. 4).

If a sixpenny piece is inserted into the slot B, it will engage one of the slots of the drum C; and as soon as the handle is rotated, the spindle will bring the second slot so that the piece of money drops into it. As, now, the piece is partly engaged in one slot and partly in the other, the latter will be temporarily connected and rotate with the spindle. The toothed pinion D will, therefore, rotate the toothed wheel and cause the wheel F to be rotated through six teeth.

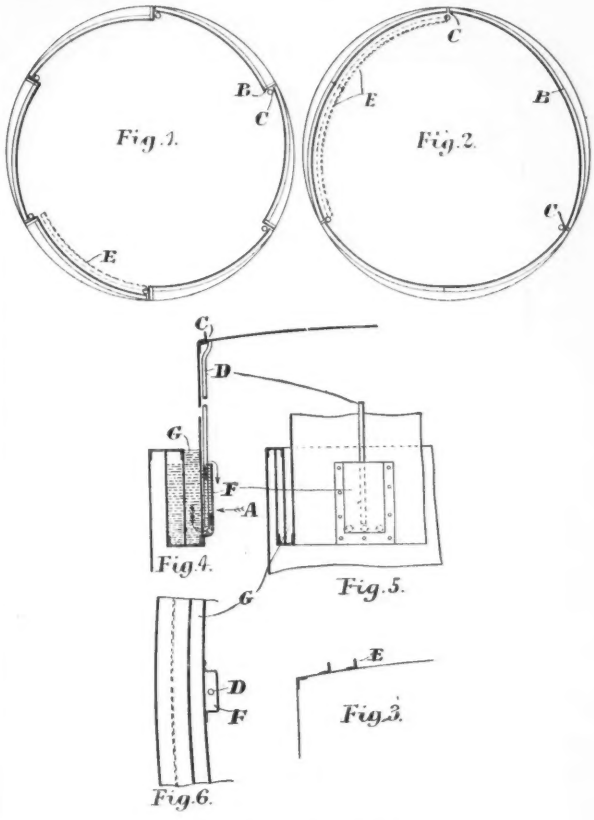
Arranged below the spindle is an incline or shoot G, having an obliquely arranged rim extending from below the slot of the spindle to an opening provided in the front side of the meter, and below which is attached a small table I. Should, now, a sixpence be inserted by mistake into the slot A (through which penny pieces must be introduced), the sixpenny piece would freely drop through the slot of the spindle and be caught by the rim. The latter brings the piece upon the shoot G, which guides it to the opening and upon the table I; thus preventing it dropping into the cash-box without operating the mechanism.

Gasholders.

Henry Balfour and Co., Barker, J., and Hunter, J., of Leven, N.B.

No. 3580; Feb. 13, 1909.

This invention aims at so confining and directing the water or moisture which may fall or be condensed on the crown of a gasholder that it will be continuously made to flow to certain points at or near the circumference and conducted to the tank, either by external or internal conductors, and "thus always tend to keep the crown seams clear of accumulated water."



Balfour's Gasholder Gutters.

Figs. 1 and 2 are views looking on the crown of a holder showing the disposition of the gutters or ridges in two forms. Fig. 3 is a part section of a holder showing portion of the crown and the side with one or two gutters. Fig. 4 is a part section showing the top lift and the one in connection with it. Fig. 5 is a view looking in the direction of the arrow A (fig. 4). Fig. 6 is a part plan of fig. 4.

A series of gutters or ridges are arranged round the circumference of the holder. The extremity B is at a higher level than that at C, because the crown is dome-shaped, and, consequently, any water which may come against the ridges will at once flow to the lowest level, even should the holder be tilted. The water thus directed may be delivered externally and flow on to the upper surfaces of the spiral guides attached to the sides of the holder, or it may flow into internal conducting pipes D passing down the inside. In fig. 2, the ridges or gutters are arranged to have two highest points B adjacent to each other, and similarly with regard to the lowest or delivery points. The dotted lines E represent supplementary gutters; their object being to ensure that no water may overflow the lowest one should there be an unusual fall of rain. Each internal conducting pipe D terminates in an internal pocket or weir F, in communication with the outside cup G by means of holes. By immersing the outlets of the pipes D in water, their outlets are sealed so far as the escape of gas is concerned, and the surplus water from the crown or the weir will fall into the tank.

Three-Way Valve for Fluids.

Peebles and Co., of Edinburgh, and Waddell, A., of Dunfermline.

No. 4201; Feb. 20, 1909.

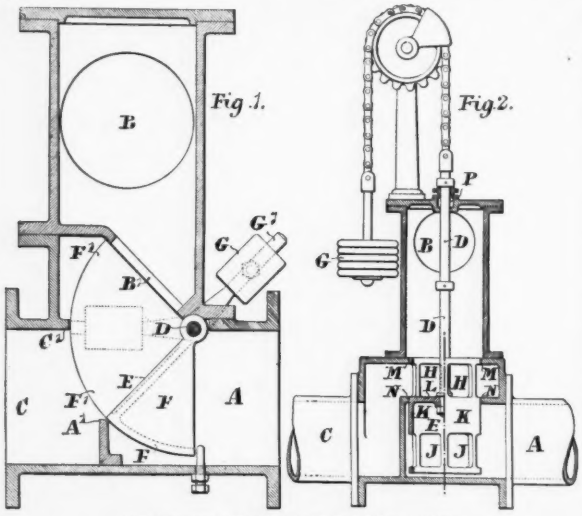
Apparatus according to this invention comprises a casing having one outlet and two inlet ports, and within the casing a valve controlling the two inlet ports, or ports communicating with them, and operated to close one inlet port by the preponderance of effective pressure (not necessarily the greater actual pressure) at the other port. Means are provided for ensuring that the valve shall not rest in an intermediate position; while in some cases there may be a permanent bye-pass between the high-pressure inlet and the outlet.

The illustrations show an example of the apparatus in which a hinged valve is used, and a like view where a piston valve is employed—"both examples being applicable to the control of combustible gas or other fluid."

In fig. 1, there are provided in a casing two inlet ports A B and an outlet C. Between them is pivoted on a horizontal spindle D a segmental valve E, alternatively controlling what are in effect three seats —one inlet seat A^1, upon which the valve is resting, a second inlet seat

B¹, above the valve, and an intermediate seat C¹. There is formed upon the rear of the valve a segmental face with side curtains F, the side walls of which may extend into lateral recesses F¹ in the walls of the valve casing. The curtain is of such size that, upon the valve rising until it meets the intermediate seat C¹, communication between both inlets A B and outlet C are cut off. The least further rise opens the outlet C to the lower inlet A; the curtain part F continuing, however, to cut off the inlet B until the valve is against the upper seat B¹, when communication is fully open between the lower inlet A and the outlet C. Thus the upper inlet B is entirely cut off before the lower inlet is in communication with the outlet C; and, reversely, on the valve descending to the position shown, the lower inlet A is entirely cut off before communication is established between the upper inlet B and the outlet C. It is thus impossible, if there be greater pressure at one inlet than at the other—as may well be the case—for the fluid at higher pressure to pass to the inlet where the pressure is lower.

In the case of low pressures, the weight of the valve E itself prevents it rising and opening the inlet A until the pressure at the lower inlet A is considerably in excess of that at the outlet C or inlet B; while it will fall as soon as the pressure at the inlet B, *plus* the weight of the valve, outbalances the pressure at the inlet A. The valve may, however, be balanced, or even set, so that the pressure at the inlet B must be higher than that at the inlet A before the inlet B is opened, by means of an adjustable weight G on a lever G¹ keyed to the valve spindle D.



Peebles and Waddell's Three-Way Valve.

Since the lever G¹ and its weight G are horizontal when the valve E is in position intermediate to the two inlets A B, and since, when in this position, the weight G is acting at its greatest effective arm, pressure in either inlet, which will cause the valve either to rise or fall to that position, will cause it to move fully up or fully down, as after the critical position the effective arm of the weight becomes less. Or the weight G may be in a position as indicated by the dotted lines; so that when the valve is in the intermediate position and the pressures at the inlet A and the inlet B are the same, the weight G will overbalance the pressure from the inlet A and cause the valve to close the passage from the inlet A—thus opening the passage from the inlet B to the outlet C. Thus it is practically impossible for the valve to remain in the intermediate position with both inlets A B closed.

In fig. 2, the piston valve E has in it two series of manifold ports H J, and between them an unpierced portion K and a diaphragm L. It co-acts with two valve seats M N in the casing—the lower for the inlet A, the upper for the inlet B. The valve is carried upon a spindle D passing out through a stuffing-box P; and there is attached to it a chain passing over a sprocket wheel and carrying a weight G, which may either counterbalance the valve E (in which case preponderance of pressure in either inlet over a mean will open that inlet), only partially counterbalance it (in which case preponderance over a given greater pressure at the lower inlet will open that inlet) or more than counterbalance it, in which case preponderance over a given greater pressure is required at the upper inlet to open that inlet.

The action of the valve is as that of the first example described. There is provided upon the sprocket wheel, a tumbler weight, whose functions in preventing the valve resting at mid-position in either direction are identical with that of the weight G in this first example—that is to say, the tumbler weight reaches a position directly over its fulcrum when the valve reaches mid-position. Therefore its effective arm is zero, and any pressure which would raise or lower the valve to this position will move it the full distance. Or the tumbler weight may be in such a position that, when the passage is open from the inlet A to the outlet C, its effective weight is minimized or altogether done away with, by being immediately over the fulcrum; so that when the valve is in the intermediate position and the pressure from the inlet A and B are the same, the weight G will overbalance the pressure from the inlet A and cause the valve to close the passage from it, thus opening the passage from the inlet B to the outlet C.

Rhyl Gas Undertaking.—It was stated at the last meeting of the Rhyl District Council that the gas-works belonging to the town were valued on their earning capacity at £110,000. The price paid for them by the town sixteen years ago was £34,000; and about £12,000 has since been expended on them. They yield a profit of nearly £2000 per annum to the ratepayers.

PARLIAMENTARY INTELLIGENCE.

COATBRIDGE GAS PROVISIONAL ORDER.

House of Commons Committee.—Tuesday, Aug. 10.

(*Before Mr.* ARTHUR STANLEY, *Chairman, Mr.* G. D. FABER, *Mr.* G. HAY MORGAN, *and Mr.* G. HARDY.)

The Gas and Water Orders Confirmation Bill, containing the Coatbridge Gas Order, which is opposed by the Corporation of Coatbridge, came before a Select Committee constituted as above. It was passed by the House of Lords on the 15th ult. (see *ante*, p. 193).

Mr. HONORATUS LLOYD, K.C., and Mr. JOSEPH SHAW appeared for the Company; the petitioners being represented by Mr. LEWIS COWARD, K.C., and Mr. R. J. N. NEVILLE.

Mr. HONORATUS LLOYD, in opening the case, said that in comparatively recent years it had been the practice of Parliament, in consequence of the introduction of the incandescent burner, to reduce the illuminating power of gas; and the object of the Order was to bring the Company into line with the modern practice with regard to testing. At present their gas was tested by the union-jet burner; but it was inaccurate and absolutely obsolete, and they were asking to substitute for it the No. 2 "Metropolitan" argand burner. The other point was that, instead of supplying gas of 20-candle power, they asked that for the future it should be of 15-candle power. Before the Board of Trade, the Company were opposed by the Local Authority, who desired to have certain concessions made to them; and their wishes were granted. But when the Bill came before the House of Lords, they again opposed, and further concessions were made. The result was that, as the Order now stood, it contained more points in favour of the Local Authority than were actually sought. The Company's original powers were obtained by their Act of 1877, when they were incorporated as a maximum price Company; but subsequently a sliding-scale was introduced, with a standard price and a standard dividend. The result was that the consumers got between five and six times as much advantage as the shareholders. In fixing the standard price at 2s. 6d. per 1000 cubic feet, Parliament also gave the Company a neutral zone, so that the sliding-scale should not operate against the Company so long as the price remained between 2s. 6d. and 2s. 11d. The Local Authority held, however, that if the Company were permitted to supply gas of 15-candle instead of 20-candle power, and tested it by a test more favourable to themselves, some concession ought to be made to them; and they suggested a considerable reduction in the standard price. This was the rock upon which the whole of the financial arrangements of the Company were founded; and if it were interfered with these would be upset, and the Company would have to divide a reduced dividend, notwithstanding the fact that they had admittedly carried on their business excellently and economically. The Board of Tade decided not to reduce the standard price; but they took away the neutral zone, which was a most serious loss. The Local Authority next asked that a testing-station should be provided at the Municipal Buildings; and, after discussion in the other House, it was so decided. Then they alleged that the pressure provided by the ordinary Act was not sufficient; and a higher one had been inserted in the Order. Clause 10 was also in the Local Authority's favour, providing as it did that, at the request of any consumer other than one by a prepayment meter, the undertakers should supply and fix, free of charge, a sufficient number of burners in substitution for those in use at the commencement of the Order. The capital of the Company was divided into two classes; the original capital having a standard dividend of 10 per cent., and the more modern capital one of 7 per cent. These dividends had varied from £10 to £11 7s. 6d. per cent., and from £7 to £7 19s. 3d. per cent.. But although that was so, the actual average return to the investors was only 4·58 per cent. The Company did not see their way to going on selling gas at the low price at which they were now able to supply it, unless they obtained some assistance. Cannel coal now stood at a prohibitive price; and gas of 20-candle power could not be obtained from ordinary coal. So that the Company had to resort to other means of obtaining gas of this illuminating power. They had availed themselves of benzol, which had the effect of enriching the gas temporarily; but if the powers which they now sought were granted, they would have to use benzol no longer, because they could get gas of 14 or 15 candle power from the coal already obtainable, and would save 2½d. per 1000 cubic feet in manufacture. The Local Authority contended, however, that the saving would be considerably more than 2½d., and that the standard price should therefore be reduced from 2s. 6d. to 2s. 2d. If this were done, the Company would be absolutely destroyed. It was also suggested by the petitioners that 15-candle power gas was unsuitable for Coatbridge, because they required portable lights for their engineering works. But what the promoters were seeking to do was what had been done all over the country in places where there were much larger works than those in Coatbridge. The Local Authority had also asked for a calorific power test; and, at the first blush, he agreed that it might seem a taking suggestion. But there was only one instance in which it had been set up—namely, in the Gaslight and Coke Company's Bill of this session. This, however, was the result of years of experiments with the coal that was used; and it was possible to tell the Committee what the standard should be. There was nothing of the sort here; and if the calorific test was to be applied, it should be by a Public Act or by an amendment of the Gas-Works Clauses Act. As to the carrying forward of certain moneys—another point mentioned in the petition—it had been raised in the House of Lords, and the promoters had undertaken to rectify the matter if necessary. If a certain amount was to be taken from the reserve fund and put to the profit and loss account, it would be done.

Mr. COWARD: I wish to have it distinctly stated in the Order; and I do not see why it should not be so. It is the usual thing.

Mr. HONORATUS LLOYD: It is not the usual thing. If we have done anything wrong, we shall have to put it right, and will do so.

Mr. *James Johnston*, the Chairman of the Coatbridge Gas Company,

then gave evidence in support of Counsel's opening statement. He said the Company was incorporated with a capital of £44,650, made up of £12,650 of original stock, and £32,000 in new shares. For the last ten years, the average dividends had been £10 12s. 6d. on the 10 per cent. stock, and £7 8s. 9d. on the 7 per cent. shares. As to the question which had been raised with regard to the reserve fund, he said the Company's accounts had been audited in the ordinary way for several years, and no question had been raised by the Corporation until they came to the House of Lords. If, however, there had been inadvertence, the Company were prepared to put it right.

Wednesday, Aug. 11.

On the resumption of the proceedings this morning,

Mr. *Johnston* continued his evidence, and was cross-examined by Mr. LEWIS COWARD, who drew attention to the statement of the witness that the Company had had to resort to their floating balances to make up their dividends in the last few years. Counsel said it was admitted that the Company had paid sums in excess of dividends, and witness had been authorized by the Directors to state that the matter would be put right. It was common ground that there had been a mistake; and the Local Authority held that these sums should be put back.

Mr. HONORATUS LLOYD: Whatever has been done by inadvertence will be put right.

Mr. COWARD: Then I shall ask the Committee to put it right in the Order.

In further cross-examination, witness agreed that the reduction in illuminating power would be really from 20 to 13 candles; whereas in the Order it was stated to be 15 candles, and would be equivalent to a saving in cost of 2½d. per 1000 cubic feet.

Mr. COWARD: And we, on the other hand, say that the reduction will be from 20 to 10 candles, and that the saving will be 4d. per 1000 cubic feet.

Witness did not agree that, as a result of the saving in the manufacture of gas, there would be a sum of £1700 a year going into their pockets, or that the consumer would get no benefit.

Mr. COWARD pointed out that the Company placed the saving at £1700; whereas the Local Authority contended it would be £2720.

Witness objected to the Company being saddled with the calorific power test, because they were only a small concern, and nobody could tell yet what the figure should be. He understood that the only instance in which the test had been applied was the Gaslight and Coke Company's Bill, where it was a matter of agreement. He acknowledged, however, that, as 75 per cent. of the Company's supply of gas was for heating, the calorific test would be an important thing.

Re-examined by Mr. HONORATUS LLOYD, witness said that though the Company were advised that the saving would be 2½d. per 1000 cubic feet, they feared that the maintenance of their works in the future was going to cost more; and their anxiety was to supply gas at a low price. It was in order to save any increase in the actual selling price that they wanted to save the 2½d. The saving to be effected by residuals was very much less. They were getting about half as much for tar as they were doing in 1903. There was no prospect of any saving being made with regard to coal.

Mr. *Thomas Wilson*, the Engineer and Manager of the Company, said that since 1898, when the neutral zone of 2s. 6d. and 2s. 11d. was fixed, the average price had been 2s. 4½d. per 1000 cubic feet. He described the question of the application of a calorific standard in the Company's case as "a farce." The candle test was quite sufficient.

A discussion took place between Counsel with reference to the calling of Mr. Henry O'Connor as a witness for the promoters. It was stated by Mr. Coward that the promoters had agreed that Mr. M'Cosh's evidence in the other House should be taken as then given. On the other hand, Mr. Shaw pointed out that Mr. O'Connor was away, and that they doubted whether they would be able to call him before the Committee. They understood that the same courtesy as had been extended to the petitioners in the case of Mr. M'Cosh was extended to them in the case of Mr. O'Connor.

The CHAIRMAN decided that it would be better not to call Mr. O'Connor, but that his evidence as given before the other House might be referred to if necessary.

Mr. *Corbet Woodall* was then called. Explaining the effect of the neutral zone, he said the Company might raise the price of gas from 2s. 6d. to 2s. 11d. without suffering in the matter; but when the price exceeded 2s. 11d. the dividends would be reduced. The effect of the sliding-scale was to make the consumers partners with the shareholders. In the case of the Coatbridge Company, if the price of gas went below 2s. 6d., there was an increase of 5s. per cent. on the 10 per cent. stock, and 3s. 6d. per cent. on the 7 per cent. stock. On the actual price now charged under 2s., there was an increase of six times 5s. on the 10 per cent. stock, and of six times 3s. 6d. on the 7 per cent. stock. The advantage to the shareholders from the sliding-scale was summed up in 1d. per 1000 cubic feet, which represented 6d. to the consumers. It was extremely creditable that the standard price in the present case should be so low as 2s., which was one of the most striking testimonies to the value of the sliding-scale system. The concern had been very well managed; and the consumers were bound to benefit therefrom. The union-jet burner was not a satisfactory one for testing 15-candle gas. With regard to the calorific power test, it was simply silly to suggest that a test of this kind should be put on a Company such as the one at Coatbridge until the matter had been more fully investigated and understood. He agreed with the Chairman of the Company that if they were to have the test at all, it should be in relation to the whole of the gas industry. At Coatbridge there had been no tests for calorific value, and no one was in a position to put in a figure as to what the calorific standard should be. Even if the whole of the gas supplied were used for heating purposes, there were no figures upon which they could fix a standard.

This closed the case for the promoters.

Mr. *E. H. Stevenson* then gave evidence in support of the petition. He agreed that the Company's works were well constructed, and he considered that the concern was well managed. But he submitted that if the illuminating standard were lowered, as was suggested, the consumers would receive gas of less than half the light-giving power than that to which they had been accustomed. He had always advocated that the consumer should get the whole of the saving effected; otherwise it was equivalent to the Company coming to Parliament and asking for an increase in the standard price. In circumstances such as these, it was entirely contrary to the practice of Parliament not to make a reduction in the standard price. The calorific power test must be commenced at some time or other; and he saw no reason why it should not be begun in the present case. They knew very well what the approximate calorific value of the gas would be; and the test which would apply to London 14-candle gas was a very generous one to apply to 15-candle gas, and need not hurt the Company in any way whatever. With regard to the accounts, there were certain sums which had been placed to the reserve which ought to have been carried to profit and loss. There was no reason why this should not be definitely stated in the Order, and then there would be no question of taking it to the Courts.

In reply to the CHAIRMAN, witness agreed that the illuminating power of the gas should be lowered; the only point was that there should be a reduction in the standard price.

Mr. *Andrew Lamberton*, a member of the Town Council, denied that there was any foundation for the suggestion that the Council intended to purchase the gas undertaking.

This closed the evidence; and no speeches by Counsel were made on either side.

The Committee decided that it should be provided in the Order that the sums which had been wrongfully added to the reserve fund should be transferred to the balance of profit and loss carried forward; that the dividends which had been paid in excess of those authorized should be deducted from net profits applicable for the payment of dividends; and that the amount paid to the insurance fund in excess of that authorized should be remedied. Subject to these conditions, the Order was allowed to proceed.

PROTECTION OF WATER SUPPLIES.

Proposed Legislation.

Lord Desborough lately introduced into the House of Lords a Bill to determine the rights and liabilities of persons supplying water under the authority of Parliament in certain cases. Its objects, as specified in a memorandum attached to the Bill, are: (1) To provide that no water undertakers shall sink wells or construct works for obtaining their supply unless such wells and works and the sites thereof have been expressly approved by Parliament. (2) To amend the law in regard to underground water, by providing that wherever private supplies are injured by the abstraction of water for public supply, by means of future works, the owner shall be entitled to compensation. (3) To provide that where, by means of future works, water is taken from any district for supply to communities outside that district, the district whence the water is taken, and through which it is conveyed, shall be entitled to demand a share of such water for its own needs, upon terms to be agreed or fixed by the Local Government Board.

In the House of Lords on the 5th inst., Lord Desborough, in moving the second reading of the Bill, said it had been introduced at the instance of the Central Chamber of Agriculture, on account of the harm that was frequently done to country districts by the unprotected state of their water supplies. The Earl of Liverpool said the Local Government Board did not fail to recognize the importance of the questions dealt with in the Bill; and the President had had them under consideration for a considerable time in connection with future legislation dealing with the protection of water rights and water supplies. In the opinion of the President, however, the Bill was too general in its proposals; and the Board did not favour its second reading. The Earl of Onslow (the Lord Chairman of Committees) said there was really no proposal in the Bill which had not already received the sanction of Parliament. It was important to discourage the idea that local authorities might sink wells wherever they chose, without coming to Parliament for the necessary sanction. Lord Newton urged that it was desirable that the Chairmen of Committees should have definite rules by which they might be guided. As it was not of much use proceeding with the Bill if the Government were unfriendly to it, he suggested that the Local Government Board should appoint a Departmental Committee to consider the special points that had been raised. A decision might be arrived at before next session, when a Model Clause serving as a future guide to Private Bill Committees might be submitted. The Earl of Crewe did not deny the importance of the question raised by the Bill, nor the existence of a grievance, and he thought there ought to be some inquiry; but what form it should take was a matter in regard to which there was considerable doubt. As to whether it should be a Committee of that House, a Joint Committee of the two Houses, a Departmental Committee, or an inquiry in some other form, the House would hardly expect him to give an opinion without consulting with his right honourable friend the President of the Local Government Board. So far as the Bill was concerned, it was obvious that it could not become law this session; and whether it was wise, in the circumstances, to proceed with it, he left to their lordships to decide. The Marquis of Salisbury thought that their lordships should agree to the second reading of the Bill; leaving for subsequent consideration the question of sending it to a Committee. The Bill was then read a second time.

The Export Duty on Coal.—In the House of Commons last Thursday, Mr. Fell asked the Chancellor of the Exchequer what would have been the revenue which would have been received from the export duty on coal if it had not been taken off during each of the past three years, and supposing such export had not been affected by the duty. Mr. Hobhouse replied that, under the conditions specified, the revenue that would have been derived during the years 1906 to 1908 inclusive was estimated at £2,500,000 for 1906, £3,150,000 for 1907, and £3,100,000 for 1908.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Wednesday, at De Keyser's Royal Hotel, Victoria Embankment—Mr. CHARLES CARPENTER (the Chairman) presiding.

The SECRETARY (Mr. F. M'Leod) read the notice convening the meeting, and also the minutes of the last ordinary meeting. The seal of the Company having been affixed to the register of proprietors, the report (which has already appeared in the "JOURNAL") was taken as read.

The CHAIRMAN: I have now the pleasure to move the adoption of the report and the accounts appended thereto for the past half year. The salient features of the Company's working during that period have been set out with the usual detail in the statement. We think that not only those who are able to attend these meetings—and I am glad to see so many present this afternoon—but those, too, whose affairs prevent them doing so, are entitled to the fullest possible information as to the Company's business; and we endeavour to give effect to this view in framing our bi-annual report. At the same time there are many details which cannot conveniently be brought under notice in this manner; and I desire to supply as far as possible these omissions in asking your acceptance of the report and accounts.

THE DIVIDEND.

We propose to pay the full sliding-scale dividend at the rate of £5 6s. 8d. per cent. per annum. As you are all aware, our dividend is a State-regulated one; the basis being the price at which we sell our gas. Of all our productions, gas is the only one which we have the sole right of supplying in our particular district. Anyone may manufacture tar products, anyone may manufacture ammonia products, or make and sell coke, all of which articles are important factors in the economic conduct of our business; but we alone are entitled to distribute gas, whether for lighting, heating, or power. In return for this privilege, Parliament fixed a basis price for it—namely, 3s. 1d. per 1000 cubic feet. This price was determined upon after full and patient hearing by Committees of both Houses of Parliament, before whom all the local and other authorities in our area of supply were represented; and its granting by the Legislature is, in effect, a "Charter" on the faith of which you have invested the money which enables the businesss to be carried on. With this basis price of 3s. 1d., you are entitled to a dividend of 4 per cent. per annum; but for every penny per 1000 cubic feet that we can sell gas at a lower figure than the standard, you are entitled to an extra 2s. 8d. per cent. Gas was sold last half year at 10d. below the basis price; and ten times 2s. 8d. equals £1 6s. 8d., which, added to £4 (the basis dividend), makes the figure of £5 6s. 8d. which appears in the report. It may not be out of place for me to remind you that, in order to entitle us to pay a dividend at this rate, gas has to be sold to the consumer cheaper to the extent of £505,380 per annum than at the standard price fixed by Parliament. As the report states, the charge for gas was reduced at Midsummer by 1d. per 1000 feet; and the dividend therefore payable for the current half year will be at the rate of £5 9s. 4d. per cent., instead of £5 6s. 8d. (Hear, hear.) So much for the dividend. I think I am justified in first devoting these few words to its consideration, because we have given a good service to our consumers; we have been, I think I may say, model employers to our workpeople; and it is now right and proper that the shareholders should receive their meed of attention likewise.

THE CONSUMPTION OF GAS.

The consumption of gas has remained to all intents and purposes unaltered. If the last six months are compared with the corresponding ones, there is a fractional decrease—namely, 0·26 per cent. But last year was leap year; and if the same number of days are compared by striking out the figures for February 29, 1908, there is a similar fractional increase—namely, 0·39 per cent. This result must be regarded as satisfactory. There is no doubt that the increase in price to which we were driven by the last advance in the cost of coal is responsible, as well as bad trade, for reduced consumption. The increased amount the gas consumer had to pay in South London as between gas at 2s. and gas at 2s. 3d. was over £154,000 per annum; and trade was too bad to enable so large a sum to be raised without some attempt at retrenchment. The slot-meter provides an admirable instrument for such a purpose; and as, out of 341,000, more than 235,000 are of this pattern, it will be realized what a large number of consumers are able to exercise this close control upon their use of gas.

THE COAL QUESTION.

The report goes on to tell you that though coal has been bought at a lower price, yet the saving has more than disappeared, owing to the reduction in the returns from coke and breeze. One would think that the purchase of coal, not only at a fair price but in regular deliveries to the capital of a country possessing large coalfields and abundance of labour, would not be the anxious matter it is. In the North of England (from which our supplies mainly come), the miners showed no anxiety to have an Eight-Hours Act. You have only to visit the North Country mining districts to see why—they are perfectly healthy and happy under the existing arrangements. Yet Parliament has placed them under the Act which Lord Joicey—possibly the greatest living authority on the subject—has said must have the certain effect of increasing the cost of obtaining coal. It would be impossible to minimize the concern to which the present unsettled state of affairs has given rise. A dispute recently happened between the Scotch coal masters and the miners, which should, and could, have been settled between them by mutual concessions. Instead of this, however, the officials of the Miners' Federation of Great Britain invited a ballot as to whether or not a general strike should take place over the whole of the United Kingdom, regardless of the loss and suffering this would entail to the entire community. The saddest part of the story is that an overwhelming majority—viz., 455,381 (518,361 against 62,980)—voted for a strike which would have paralyzed all industry and taken from many thousands their means of livelihood. We know, and you know, what co-partnership has done for us, yet when an endeavour was made to apply the self-same principle to one of the Durham collieries, the attempt failed because the men did not see their way to follow their employment without having what we may call the strike weapon up their sleeve. Well, our course in the matter is a perfectly clear one. We owe a duty to the State in making known upon every possible occasion the incalculable good co-partnership has been in our relation with our employees; and we owe a duty to ourselves by laying down as large a stock of coal as we can carry, so that, despite heavy cost and loss by storage, we are in a position to fulfil our obligations to our consumers whatever disturbances may arise.

RESIDUAL PRODUCTS.

So much for coal. It is a relief to turn aside from its consideration to other and more pleasing topics, though its importance is such that it might well have occupied the whole of my remarks this afternoon, to the exclusion of everything else. The price obtained for coke sold in the London area was, on the whole, a fair one. Our policy has been to keep this as far as possible at a uniformly reasonable figure; and we think such a course is more likely to be mutually beneficial to producer and consumer than if advantage is taken of every cold snap or temporary shortage to increase prices. But the main cause of our diminished revenue under this head arises from the price we obtained for the coke sold to the manufacturers of cement. We have for many years past looked to this industry for the absorption of the surplus produced by us, and have sold to them at a reduced rate the balance of our production. This year, too, we had left unexpectedly upon our hands by them a good deal which we had to place elsewhere—a contingency we must endeavour to avoid in the future. Our other important residuals are tar and ammonia. Their production in Europe is an increasing one, largely owing to the recovery plants which are rapidly being installed as adjuncts of coking-ovens. Greater quantities of tar are now, however, being used for dustless road making; and this requirement will largely absorb the surplus. Timber is becoming scarcer, and cannot nowadays be used in the old reckless manner. Even in America it is being found necessary and economical to creosote railway sleepers, &c., and thus prolong their life; and large quantities of creosote are now exported abroad for similar purposes. Increased production probably accounts for the lower price of sulphate of ammonia. It is for most purposes by far the best, as it is the cheapest nitrogenous manure; and it is satisfactory to be able to say that British makers have joined hands with our German friends (or should I say cousins?) for propaganda purposes among prospective users. Till a few years ago, we were large exporters of sulphate of ammonia; but Germany, owing to the great change which has come about in industrial conditions, now makes more than she requires, and exports out of her country as we are exporting out of ours. But we have, as I say, fortunately entered into an arrangement by which we can disseminate the knowledge of the advantages of sulphate of ammonia over any other form of nitrogenous manures to these different countries which are requiring any of it. I may say Japan is one of the largest customers for sulphate of ammonia, and great quantities are sent there from Europe.

IMPROVED WORKING RESULTS.

We have effected a large saving in our requirements of coal, which has come about as the result of improved working in the retort-houses. Some six years ago, I paid a visit to France to inspect the working of some new machinery which had been devised for the purpose of filling and emptying the retorts. The machines were ingenious, although complicated; but I was sufficiently impressed to hand over the problem to one of our own works with instructions to solve it hydraulically instead of electrically. The French engineers had used electric current to transform the power into work; and much the same difficulties had arisen as in the case of the naval gun-designers in working guns in battleship barbettes. In order to satisfactorily convert electricity into work, it is necessary in almost every case to have rapidly running machinery. In the case of lifting a gun, for instance, you can quite understand that the speed of the motions is comparatively small; but a considerable amount of power is required. The same difficulty arose with regard to these stoking machines; and when we adopted the principle of working hydraulically, our engineers at one of the works were able to design and make very successful machines. The works solved the problem very neatly, and many machines (22 or 24 in all) have been constructed to their design. The machine pushes the carbonized coal from the retort instead of pulling it out; and thus we are enabled to fill up the entire retorts instead of partly, as in the old case; and the result is we get a greater yield of gas. Of course, we must not be disappointed if we make a correspondingly less quantity of the residuals. We are gas manufacturers first and foremost; and, broadly speaking, the greater the proportion of the weight of the raw coal we can turn into gas the better. Especially must this be the case if we do not depreciate our residuals in the process. But so far from this being the case, they are improved by the new system of working. The tar is better, the coke is better, and the ammonia is somewhat more. As Chief Engineer, I gave it as my opinion in 1900 that we might look forward to making 11,000 cubic feet of gas per ton of coal. It is satisfactory to know that we have now not only made, but have actually sold, more than this quantity; and the figure referred to in the report does not, I am sure, by any means represent high-water mark.

DISTRIBUTION.

Paragraph 4 refers to the distribution of the gas. The costs attending this do not diminish, nor do I think we must expect them to. We nowadays give the public a much more extended service than was understood by the word a dozen years ago. They want it, however, and although, as shareholders, you might legitimately complain that you are getting no sliding-scale dividend in respect of costs so incurred, yet the general effect is to strengthen and popularize your business (no longer a monopoly) as suppliers of light, heat, and power. And as to the wisdom of such policy, there can be no manner of doubt. To take only one instance, our area of supply extends over more than 50 square miles; and to have but one office through which we and the consumers could get into touch was centralization carried too far, however advantageously that office was placed.

WATER-SLIDE CHANDELIERS.

Good progress has been made in the crusade against water-slide chandeliers, though it is remarkable how tenaciously some people cling to an appliance whose antiquity dates back to the early days of the last century. However, if we have not yet succeeded in eradicating them, we have an accurate record where every one exists, and we shall not cease our efforts until the last one disappears. I hardly need recapitulate the reasons which induced the Board to take the line they have in this matter, except to say that, with the disappearance of this antiquated fitting, the claim of gas to be the safest, as well as the cheapest, artificial illuminant will be an unanswerable one.

THE SIR GEORGE LIVESEY MEMORIAL.

At our last meeting, I explained how it was that this Company had been called upon to take its usual leading place in gas matters by heading the fund which was being raised in Great Britain and Ireland to perpetuate the memory of your late Chairman. The proposal has taken the definite shape of endowing a Professorship at the Leeds University, which will be named the "Livesey Chair of Gas Engineering." Sir George, during his lifetime, made himself personally responsible for the collection of certain subscriptions in order to promote research at this centre of technological study; and I cannot conceive any memorial which would have been more pleasing to him than the one now in contemplation. It is hoped that the endowment may reach £12,000; and of this, £10,200 has already been subscribed. The Board were very gratified at the enthusiastic manner in which, six months ago, you received their proposal to make the contribution that has been given, and which duly appears in the present accounts. I feel sure it will become something more than a recognition on the part of the gas consumer as well as the shareholder of how much both owe to the life-work of Sir George. I consider it must be looked upon also as an investment made upon their joint behalf which cannot fail to be productive of material advantage to both. But we ourselves shall have our own and personal memorial to the able far-seeing man who established this Company upon the basis which carries it so firmly to-day. And you will no doubt like to hear how the execution of this is proceeding. Well, I am pleased to say that Mr. F. W. Pomeroy, in whose hands the work was placed, has modelled an excellent statue, and I believe when you see it in bronze you will agree that it is not only a good and characteristic likeness, but a thoroughly artistic production as well. The model is now in the founder's hands; and in the late autumn, if all goes well, its erection will be completed.

INVESTED FUNDS.

Paragraph 6 deals with our invested funds. Our Act of Parliament requires that both the reserve and insurance funds should be invested in what are called "Trustee Securities;" but you do not need our report to remind you what has happened to this class of investment the last few years. Railways, Docks, Consols, and Corporations' Stocks, &c., have all gone down; and the recovery of their lost position does not seem to be within measurable distance. The question of depreciating the values at which our investments have been appraised has been before the Board more than once; but the occasion never seemed appropriate. We think, however, the present time is opportune; and so we have written down the reserve and insurance funds by, in the one case, £10,614, and in the other £14,113, to their respective market values at the present time. You will see the entries under Nos. 6 and 8. We have not needed to make any alteration to No. 7, the leasehold renewal fund; and it is an interesting commentary upon this fact to explain that we have been free to invest, and have so invested it, entirely in our own business.

WARNING AGAINST WORTHLESS COMPANIES.

While upon the subject of investments, there is one matter which I hope you will allow me a few moments to touch upon. There have been some gas companies floated during the past year or so, to which the very mildest expression I could apply would be that their prospects were not particularly rosy. Their prospectuses have, however, been circulated to another public than the ordinary speculator. Lists have been prepared of the names of shareholders in reputable companies such as our own; and to these holders the circulars to which I have referred have been sent—it being assumed, I suppose, that the people would think there is nothing like gas. We struggled against giving these lists of names; but it appeared, from a recent decision of the Courts in the case of another gas company, that there was no alternative; so we had to give way. A little while ago, I received a letter from a firm in which they enclosed a pamphlet and said: "To one interested in raising capital or selling something, the list of 'ladies with honey' is invaluable." Well, it came as a surprise to me that ladies specialized in sweetness until I opened the circular and discovered that the "honey" was of the "Kilmansegg" variety, and that I had mistaken an "M" for an "H" in their letter. Well, especially to our lady shareholders, may I say this: Do not put your money into an unknown gas company because you have happily invested in this one, but go to a stockbroker and ask his advice. It will not be infallible; but it will be honest, which is more than I can say for some of the bubble gas companies to which I have referred.

CO-PARTNERSHIP.

Mention is made in the next paragraph as to the Company's co-partnership; and testimony is borne to the help and assistance it has been in the conduct of the Company's business. Twenty years under its advantages have given to our staff and our workpeople an education in affairs, the value of which it is impossible to over-estimate. Contrast what is known now with what was said of it twenty years ago! It was stated then that, by becoming a co-partner, the working man was selling his birthright. To-day you have a loyal and devoted body of employees attached to you by bonds which can best be described in Burke's words "light as air yet strong as iron."

EMPLOYEE-DIRECTOR.

The concluding paragraph of the report refers to personal matters. In Mr. Drumgold we have lost an able Employee Director, whose sympathetic and common-sense utterances I am sure you will miss at the half-yearly meeting. But those qualities of heart and mind with which you became familiar are not less valuable in the post of Chief Storekeeper than at the Board-room table. We believe that in Mr. Hunter there has been elected a worthy successor.

NEW CHIEF ENGINEER.

The report also records the selection by the Board of a Chief Engineer in the person of Mr. Doig Gibb. From what I have seen and known of this gentleman, I feel sure the choice will prove a wise one, and that Mr. Gibb will fill the position with advantage to the consumers, the shareholders, and the employees.

THE REPORT AND ACCOUNTS ADOPTED.

I beg now formally to move: "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

Mr. ROBERT MORTON seconded the resolution.

Mr. E. KIMBER said that, before the resolution was put to the meeting, he would like to say a few words. He thought the Company were to be congratulated upon their half-year's proceedings. So far as he could see, the Company stood in a strong position. They had in store on June 30 140,000 tons of coal; and as in the half year 570,000 tons were carbonized, they had in store about one-fourth of the half-yearly requirements—equal to about six weeks' consumption. Therefore, had the threatened strike taken place on July 31 last, the Company would have been in a tolerable secure position, having in hand a six weeks' supply with which to fight the strikers. With regard to the statement that this Company obtained 11,000 cubic feet of gas per ton of coal, he recollected having had several discussions with the late Sir George Livesey, who always said that if he could get above 11,000 cubic feet of gas per ton he would be satisfied. But he gathered from the words of the Chairman that the chances were that in future they would get a still larger production, thanks to the perfection of their procedure and the enlightenment, prestige, and scientific attainments of their worthy Chairman. With regard to the threatened strike, that was one of the most cruel threats conceivable coming from any body of civilized men. It was impossible to conceive that a body of men like the Miners' Federation should be so wicked as to threaten the whole country, and to overturn and destroy the working of great companies like this and other industries simply out of private pique or malice or ill-will towards people from whom they differed. As he had stated at the meeting of the Gaslight and Coke Company the other day, there was an independent supply of coal which might be brought from New York to Liverpool, free on board, at 5s. 4d. per ton. But Nova Scotia was less distance from the Thames than New York from Liverpool; and they had lately heard from the Government of Nova Scotia that their coal supply could be put free on board at Nova Scotia at 5s. 3d. per ton. If it could be carried to this country for another 5s. per ton—and he was not sure it could not be—they would have coal in the Thames from Nova Scotia at 10s. 3d. per ton, as against the price at present paid by the Company of 12s. 10d. He offered his hearty congratulations to the Chairman and Board for the very successful way in which they had carried on the Company's business.

The resolution was carried unanimously.

THE DIVIDEND.

The DEPUTY-CHAIRMAN (Mr. J. Ewart) moved: "That a dividend at the rate of 5½ per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post." As the reasons for the largely increased revenue had been fully explained in the report and in the remarks of the Chairman, he would only say that it was satisfactory to know that this great improvement was due not to outside causes, such as the lower price of coal or improved prices for coke and other residuals, but to internal economy and improved methods in carbonizing. It was satisfactory to know that gas still continued to successfully meet all competition, whether as a form of power or as an illuminant; and he doubted whether the resources of the industry were even yet fully realized.

Mr. J. D. C. HUNTER (an Employee-Director) said that all would benefit by the result of the satisfactory half-year's working. Most gratifying of all, the employees would receive their share in the shape of a 7½ per cent. bonus on their wages and salaries. Secondly, consumers were receiving gas at a reduced price, and shareholders were to be paid the full statutory dividend. As also a large balance was to be carried forward, the Company were in a very good position indeed. Personally, he benefited by the satisfactory working in a threefold manner; for besides being an employee, he was also a consumer and a shareholder. The co-partnership scheme was a greater success than it had ever been—its roots, like those of a tree, being deeper struck and its branches wider spread than ever before. He felt it a great honour to stand there to second the resolution, and the position was to him one of great pleasure.

The motion was adopted, and the business of the meeting concluded.

VOTES OF THANKS.

Alderman HOWLETT said he thought they should not separate without passing a very hearty vote of thanks to the Chairman and Board for their assiduity and attention to the affairs of the Company. They had a capital, even a magnificent, report; and no doubt there was better yet to follow. In the matter of gas-making there could be no standing still—they must either go forwards or backwards; and the policy of the Company was the forward one. They were not here to-day to discuss the sources from which they could obtain cheap coal in the future. A good many other things came into play, whether, for instance, the coal would make a good coke, which was a very interesting subject to himself especially. There was some coal which made abominably bad coke. For this reason he hoped that things would work smoothly and keep at their present level. No doubt the improvement in machinery had contributed to the fact that they had never had a better residual in the shape of coke than they had to-day; and he was glad the Company should have a good character for fuel of this sort. The hand of the Chairman was very largely impressed on the report. Nothing he had done in connection with the Company had been done in a hurry. He was always moving slowly but surely; and no doubt the very important improvements which had come about had been largely due to his industry and ability. The Company were peculiarly fortunate, having lost one of the best men the world had ever seen from the engineering and gas-making point of view, in being able to fill his place by one so

admirably adapted for the position as the present Chairman. With regard to the other members of the Board, whom they had known for many years, they were all good men and true—not mere guinea pigs, but men engaged in the earnest work of the Company, and with money invested in it.

Mr. W. STOTT seconded the resolution, observing that he felt, with Mr. Howlett, that the Company were very greatly served by the present Board, and were especially happy in their choice of a Chairman to follow Sir George Livesey. Shareholders would agree that the society or Company to which they belonged was in a very flourishing condition whatever might be in store in future. He himself was very optimistic about the coal business, having travelled in America, where there were tremendous beds of coal. He looked forward to by-and-by seeing steamers bringing coal from there. Though he had no doubt our own supply would last us a couple of hundred years, there would be an advantage in getting coal from America.

Alderman Howlett put the resolution, which was carried by acclamation.

The CHAIRMAN, in acknowledging the compliment, said the Board were "united" in every sense of the word. Different qualifications were represented on it, and as the result the shareholders had their business managed in a manner which he was pleased to think they considered satisfactory. He must not, however, sit down without proposing a vote of thanks to the hard-working and loyal staff which played so important a part in achieving these satisfactory results. He could not on this occasion ask both sides of the business to respond—only the commercial element being represented here. But Mr. M'Leod, fortunately, had other qualifications than that of the commercial man—he had technical knowledge, which was very useful to him in the position he occupied. On the next occasion, the engineering side would be represented by the new chief—Mr. Doig Gibb.

Mr. E. KIMBER seconded the proposal. Anyone who knew anything about gas-works must know the enormous risks to health and sacrifices of comfort workers in gas-works must undergo. Shareholders might be glad to hear that he did not represent the capitalist, though he had spoken so strongly. He represented the Trustees of three large charities holding £20,000 of stock, all of whom were among the servants of the poor, and especially workmen in gas companies who required attention in hospitals.

The motion having been adopted,

The SECRETARY (Mr. M'Leod) acknowledged the compliment, and said that an additional reason for the satisfaction expressed was that outside the official staff there were 5000 employees holding stock in the Company. This meant that the interests of employees and shareholders were identical, and that the employees would do everything in their power to maintain the high efficiency the Company had secured.

BOURNEMOUTH GAS AND WATER COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the Bournemouth Gas and Water Company will present at the half-yearly meeting next Friday, they state that the volume of business done in both gas and water in the six months ending the 30th of June, shows a satisfactory growth in comparison with 1908. Residuals fell in price; but coal cost somewhat less. The accounts accompanying the report show that the revenue from gas was £48,680, and from water £18,754; the total receipts being £83,320. The expenditure (including £1075 for the co-partnership scheme and expenses) was £60,106; leaving £23,214 to go to the profit and loss account; compared with £21,692 at the end of June last year, though the price of gas was reduced 3d. per 1000 cubic feet in October last. The balance available for distribution is £37,260; and the Directors recommend the payment of dividends (less income-tax) for the half year at the rates of 6 and 7 per cent. per annum on the preference and "B" ordinary shares respectively, and at the rate of 15 per cent. per annum on the original share capital of £50,000. These dividends will amount to £16,913, and leave £20,347 to carry forward.

The statements relating to the working results show that, under the supervision of Mr. Harold W. Woodall, the Engineer and General Manager, 19,452 tons of coal, and 418,038 gallons of enriching oil were used in the production of 375,950,000 cubic feet of gas, of which 348,080,182 cubic feet were sold and 358,621,272 feet accounted for. The residuals produced were: Coke, 11,360 tons; breeze, 1770 tons; tar, 230,242 gallons; sulphate of ammonia, 172 tons.

Additional Storage at the Camborne Gas-Works.—At the invitation of the Directors of the Camborne Gas Company and Messrs. Willey and Co., of Exeter, a large gathering took place at the Tuckingmill Gas-Works last Thursday to inspect a new gasholder. The tank is 63 ft. 6 in. in diameter and 20 ft. 6 in. deep, and the holder 60 feet in diameter. Its capacity is 100,000 cubic feet; and the tank will hold 406,000 gallons of water. Mr. H. P. Vivian presided at a luncheon served in the holder; among those present being Messrs. F. T. Depree (Chairman of Messrs. Willey and Co.), S. J. Ingram (the Company's Consulting Engineer), W. J. Couch (the Secretary), and C. C. Veale (the Works Manager). Mr. Depree proposed "The Camborne Gas Company," and in responding, the Chairman said since twenty years ago the annual make of the Company had increased from 8 to 23½ million cubic feet. He regretted the death of Mr. W. Bailey, who was Manager for forty years. Mr. Ingram said there was a greater mileage of gas-mains in Camborne than in any other town in Cornwall. The recent increased assessment of the Company's premises meant an additional cost of 1d. per 1000 cubic feet; and at present they paid in rates and taxes 2½d. for every 1000 cubic feet of gas manufactured. This tended to keep up the price of gas; but the Directors were determined to do everything possible to reduce the cost of production. Mr. C. Bryant proposed "The Contractors." Mr. Depree, in responding, said by the death of Mr. Bailey he had lost a personal friend, and the Company an efficient servant.

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting; and the Directors' report and the accounts (which were given in the "JOURNAL" last week) were taken as read.

DIRECTORATE CHANGES.

The CHAIRMAN, in moving their adoption, said: I must preface the remarks I have to make to you to-day with an expression of sincere regret at the loss the Company have sustained since we last met you in the death of our colleague, the Right Hon. Sir John Colomb. Sir John had been a Director since the year 1890; and during the nineteen years which have elapsed, he has rendered to the Company much valuable service. He was not an engineer by profession, nor had he received a business training in the strict sense of the word; but he was a most useful Director, because he brought to the consideration of our business a wide knowledge of men and affairs, and such a fund of shrewd common sense, that he enriched every discussion which took place at our Board, and broadened the view with which every question was regarded. As I say, he was a most useful Director; and we shall long miss his services. We have elected in his place, Mr. Henry Willingham Gell, whom you appointed as an Auditor some five years ago. It is said that "imitation is the sincerest form of flattery;" and I think therefore the Directors have paid the proprietors a compliment in following the lead they gave us in making Mr. Gell an Auditor.

SIGNS OF TRADE IMPROVEMENT.

Now turning to the affairs of the Company during the past six months, I think you will agree with me that the half year compares favourably with the corresponding half of 1908. When meeting this time last year, we had to tell you that our profit fell short of our dividend by no less than £7349. Now I have the pleasure of informing you that the profit exceeds the dividend by £2070. Last year I had to report for the first time for some years that we had a decreased sale of some 27 million cubic feet of gas. Now I am pleased to tell you we have an increased sale of 36 million cubic feet. This time last year we were passing through a period of depressed and declining trade; and the outlook was, to say the least of it, somewhat unfavourable. On all sides now, I think we have signs of improvement. In America—whence we get very often our trade as well as our weather—the manufacturers are building fresh factories and increasing their machinery and staffs. A gentleman high in the commercial world said two or three days ago that a boom in trade was not only coming, but had already arrived. I was present at a dinner the other night at the Mansion House to the bankers of the City of London when the Chancellor of the Exchequer spoke; and the whole of his speech was occupied in dealing with what he considered to be signs of improvement throughout the country. If you look at the Board of Trade returns, you will see that, for the first time for eighteen months, in the month of June our exports were up by ¾ million; and the July returns are yet still better, because they have improved by no less than 1¾ millions. You can find an echo of this in our own accounts, because our bad debts—a sure barometer of the trade weather—are less than they were last year.

COAL, THE ONLY CLOUD.

The only cloud upon the horizon is the uncertainty existing in the coal trade, and the unrest, which appears to be a perennial malady, among the miners. It is true that a coal strike over the Scotch differences has been happily averted; but we have yet to feel the effects of the Eight-Hour Act, and the demand for higher wages which is certain to accompany, and will probably precede, improved trade. But turning for a moment from what may be to what is, you will be gratified to know we have bought our coal and oil at considerably lower prices; and we expect during the current year to make a large saving in that respect. Of course, you must bear in mind that whatever saving we make will be modified and lessened by the smaller return coke will give us.

A CHANGING BUSINESS.

If you will look at the accounts for a minute or two, you will see we have spent £8355 on capital account, and have a credit of £808. This is rather unusual, and I will explain it. We sold a small strip of land, part of our old Stepney works, to the London County Council, for the widening of the bridge over the Regent's Canal. This produced £700; and the balance of £108 is for meters taken into stock, and therefore credited to capital account. The whole of the £8355 that was expended on capital account was laid out in providing distributing plant, which represents new business. We fixed 1492 additional stoves, and 3548 additional coin meters; but our ordinary meters were less than they were this time last year by 231. I am very sorry for this. A decrease in the ordinary meters always disappoints me. I told you just now our sale of gas has increased by 36 million cubic feet. Actually we sold through coin meters 40 millions more; but through ordinary meters, nearly 4 millions less. So you see our business is undergoing a change. We are selling more gas in pennyworths; but less gas to our credit customers. When I first joined the Company (I think I am right in saying), practically all the gas was sold after dark. Now 50 per cent. of the gas being sold is consumed during the hours of daylight. A very large proportion of this is used for fuel—in fact, not only do we sell gas for driving gas-engines, but—this is another industrial use that has come to us—for the purpose of heating crucibles. The Directors were interested the other day in going round the works to see that our outdoor department were beginning to manufacture their own gas pendants, and were executing a large order for one of the Company's customers—smelting their own brass, making their own castings, and doing it all by the aid of a gas furnace.

ILLUMINATING TEST OBSOLETE—REGRETTING CALORIFIC TEST.

Of course, the change in the use of gas to my mind renders the illuminating test and penalties for that test altogether obsolete; and the competition to which we are now being subjected from cheap oil and

electric light renders a test absolutely unnecessary. We are bound to provide the best article we can manufacture at the very lowest price, or we could not compete with our trade rivals. All tests are detrimental both to the Company and to the consumers, because they tend to hinder the Company from providing the article that the public require. The days of monopoly, when a gas company could snap their fingers at the public, are ended; and they will never return. We realize now that we must give if we want to get. The high road—the only road—to prosperity is to provide the cheapest possible gas at the cheapest possible price. I say this because I have seen, with the greatest regret, that one of the London Companies, under the exigencies of a fight in Parliament, has accepted a penalty calorific test. I believe that is a retrograde step; and I view it with regret. There is no longer necessity for tests; indeed, tests are harmful to the public whom we supply.

PRICE OF GAS.

It is our great regret—and it is the only regret of the half year—that we do not see our way to reduce the price of gas. We are charging the moderate price of 2s. 6d.; and it would have given us pleasure if we could have brought that down. When I tell you that a reduction of 1d. per 1000 cubic feet represents £6617 in a half year, and that our surplus profit over the dividend is only £2070, you will see we are not in a position to reduce the price without depriving you of some part of your dividend. You may rest assured, however, that the Board will take the first opportunity of reducing the price, and so increasing your dividend and the bonus we pay to our co-partner employees.

GOOD WORK IN THE MANUFACTURING DEPARTMENT.

Turning to the revenue account, I have said that we manufactured in the past half year 36 million cubic feet more than in the corresponding half of 1908; and the cost of manufacture was £13,551 less. Actually, we spent in the purchase of coal and oil, and in bringing them into our works, £13,127 less. Although we manufactured so much more gas, we used considerably less raw material. This speaks volumes for the scientific work accomplished by the Engineer, and the energy and the goodwill of the men who work under him. And I may point out that our carbonizing wages which were £14,943 in the past half year, were £16,639 in the corresponding period of last year; so that there has been a saving there of £1695—another indication of good and willing work. Some of you will have seen in the technical press references to the new carbonizing methods. Gas engineers are beginning now to use rather larger charges in their retorts, and to subject them to heat for a rather longer time, with good results. I only mention this, in order that I may tell you our Engineer is not behind any other engineer in this respect. He is making experiments at two of our works, which experiments have been very satisfactory indeed—in fact, I may tell you the make per ton is no less than 11,403 cubic feet, which those who follow gas affairs will recognize as a very good figure indeed. I ought perhaps to warn you that this figure may not always be reached, because the make per ton must be dependent, to a large extent, upon the quality of the coal with which the Directors supply their Engineer. We may not always be able to get, or buy profitably, such good coals as at the present time.

HALF-YEAR'S REVENUE.

Our sale of gas produced more by £4540, which is the equivalent of the 36 million cubic feet extra gas sold. The increase amounted to 2·33 per cent. on the sale of the corresponding half year, when we had to come and tell you we had sold less gas than the previous year. I am glad therefore to see this satisfactory addition to the business. While we had this increase, our neighbours the South Metropolitan Gas Company had an infinitesimal decrease; and the Gaslight Company an increase of about ¾ per cent. So that our 2·33 per cent. increase compares very favourably indeed with our neighbours. It is true, as I have pointed out, the increase is due, in large measure, to the additional stoves and coin-meters we have fixed. The rental from stoves and meters is £1722 more; but residuals—coke, breeze, tar, and sulphate of ammonia—produced less by £7991. Coke and breeze yielded less by £9816; but tar and sulphate gave us £1824 more. Thus the total receipts were less by £1758. But then we spent £10,705 less; so that the profit is more by £8947—being £63,922, compared with £54,974 this time last year.

A SATISFACTORY RESULT.

Turning to the net revenue account, interest amounts to £9026. Of course, the interest balance tends to go up, because the borrowing from the bank is much larger than it has been; but we pay our bankers less interest than we should pay the proprietors if we issued more stock. Therefore it pays us to let the balance run up a little. Interest amounting to £9026 leaves £54,896 as the half-year's profit available for dividend. Paying the dividends at the ordinary rates of £5 4s. per cent. per annum on the 4 per cent. stock and of 5 per cent. on the 3¾ per cent. stock will absorb £52,825, and leave a surplus of £2070. We brought forward £20,988 into the half year, and we carry forward to the current half year undivided profit amounting to £23,059. I think you will agree that this is a result which is very satisfactory in itself. In one respect it is disappointing to me—that is, because it does not justify us in reducing the price of gas. In conclusion, I may say that our works are in first-rate order, and amply sufficient for our requirements, and that our relationship with the men is everything that can be desired. I believe, too, that the prospects of the Company were never better than they are at the present moment.

The DEPUTY-CHAIRMAN (Mr. Walter Hunter), in seconding, said he should like to join in the expression of regret at the deep loss the Company had had in the death of their friend and colleague Sir John Colomb. He had known Sir John perhaps longer than anyone else in the room, both as a friend and as a colleague; and he was everything one could desire. The Directors, he should like to add, had a very satisfactory meeting the other day at Stepney with the Co-partnership Committee; and he was more convinced than ever that the scheme was doing excellent work for the Company.

Mr. ENNIS said he had been very interested in, and was fully alive to the importance of, the consummation of the equalization of the day and night consumption. The Chairman had expressed regret at not being able to reduce the price of gas. The proprietors were always glad when the price could be reduced; but he personally felt that a reduction was a thing into which they should not rush prematurely. He understood from the Chairman that 1d. reduction represented about £12,000 a year. That was a goodly sum in the total; but 1d. reduction nobody hardly felt. He thought that it would be better for their business if a portion of the £12,000 a year was devoted to giving greater facilities to the poorer of their consumers.

The CHAIRMAN, in thanking Mr. Ennis for his kindly remarks, said the Company did look after the poorer consumers in identically the manner indicated. The slot consumers paid them extra for their gas; but it cost the Company a great deal more than that in providing and fixing the services and fittings. If the consumers liked, the Company also provided and fixed mantles for them at cost price. The little extra obtained for gas sold through the coin-meters did not actually compensate the Company. It was really an expensive form of selling gas. The 10d. extra did not represent the whole outlay made. Therefore they were sacrificing something on behalf of the small consumers; and they did everything they could to encourage and help them.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, the dividends mentioned in the Chairman's address were declared, less income-tax.

ELECTION OF NEW AUDITOR.

The CHAIRMAN said the proprietors had had notice that two fully qualified proprietors—Mr. B. W. Ellis and Mr. B. M. Gill—had given notice of their intention to seek election, to fill the vacancy caused by the elevation of Mr. Gell to the Board. He (the Chairman) had had a letter from Mr. Gill stating that he had no wish to put the proprietors to the trouble of a contested election; and so he withdrew in favour of Mr. Ellis.

Mr. DAVIES formally proposed, and Mr. FARNAN seconded, the election of Mr. Ellis as an Auditor.

Mr. WILKINS pointed out that the proprietors had not the slightest information concerning Mr. Ellis.

Mr. DAVIES remarked that Mr. Ellis had been a proprietor for more than twenty years, and had been connected with several other gas companies.

ANOTHER PROPRIETOR asked if Mr. Ellis was a relative of the Secretary?

The CHAIRMAN: He is a son.

The motion was carried *nem. con.*

Mr. ELLIS thanked the proprietors very much for electing him as one of the Auditors, and assured them that he would give his best attention to the duties of the office. He had also to thank Mr. Gill for withdrawing his candidature; and thus saving the proprietors a contested election.

VOTES OF THANKS—THE WORK OF CO-PARTNERSHIP.

Mr. ENNIS proposed a vote of thanks to the Chairman and Directors; and, in doing so, said he was sure the proprietors desired to associate themselves with the expressions of regret from the chair as to the loss of such a man of distinction as Sir John Colomb.

Mr. WILKINS seconded the motion; and it was unanimously carried.

The CHAIRMAN having acknowledged the vote, proposed a similar compliment to the Secretary, the Engineer, staff, and employees of the Company. He could only say that during the past half year they had received the most willing and effective service from them all. Mr. Hunter had referred to the meetings with the Co-partnership Committee, which consisted of twelve members nominated by the Board and twelve members elected by the men. It was some years ago since they first met. He could say that at that time he did not look forward to the meetings with a great deal of pleasure; but now he regarded them as one of the most pleasurable times in the whole year. The men understood the Board; and the Board now understood the men. Profit-sharing had brought them together; and they felt their interests were identical. It might interest the proprietors to know how profit-sharing had benefited the men, without imposing an undue tax on the Company. The first year they had £4000 to their credit in the Company; now they had £44,000 standing to their credit. The Directors frequently had instances of the benefit the savings in the Company were to the men and their families. In every sense of the word, co-partnership with them had been a great success. He was gratified to see how it had extended all over the country. He believed that Sir George Livesey, when he introduced co-partnership to the gas industry, really hit upon something that would bring capital and labour together.

The DEPUTY-CHAIRMAN seconded the motion; and it was heartily carried.

Mr. ELLIS, in acknowledging the vote, said this was the sixtieth half-yearly meeting at which he had had the pleasure of responding to this vote. He was happy to say that, during the whole of the thirty years, he had been blessed with health and strength, and had never been absent for a single day through ill-health. The clerical staff—particularly Mr. Bradford, the Accountant, and Mr. Maddocks, his own assistant—richly deserved the acknowledgment that had been made of their services by the proprietors.

Mr. STANLEY H. JONES, replying for the engineering staff, thanked the Chairman very cordially for the kind expressions that had fallen from his lips. Of course he (as Engineer) could not do his work properly unless he was supported by a good staff and willing workmen. The relations between the men, the officers, and the Board were of the most satisfactory nature; and he could endorse all the Chairman had said as to the Co-partnership Committee meetings.

The CHAIRMAN observed that it might interest the proprietors to know that in 1879, when Mr. Ellis joined the Company, they sold 1375 million cubic feet of gas; last year, they sold 3122 million cubic feet, or much more than double what they did thirty years ago.

At a recent extraordinary meeting of the Skegness Gas Company, it was decided to raise £3000 of additional share capital, in £5 shares, in accordance with the Company's Orders of 1902 and 1907.

WEST HAM GAS COMPANY.

The Final Half-Yearly Meeting of this Company was held last Tuesday, at the Liverpool Street Hotel, E.C.—Mr. J. LISTER GODLEE in the chair.

The SECRETARY (Mr. A. G. Snelgrove) read the notice convening the meeting, and the Directors' report and the accounts were taken as read.

THE LAST ORDINARY REPORT.

The CHAIRMAN, in moving the adoption of the report and accounts, said the former began with the words: "This will in all probability be the last ordinary half-yearly report the Directors will present to the stockholders of this Company." Had the report been dated that day, instead of July 27, the sentence would have stood as follows: "This is the last ordinary half-yearly report to be presented by the Directors of this Company to the stockholders." The Act for the amalgamation of the Company with the Gaslight and Coke Company had been read the third time in the House of Lords, with some slight amendments. These amendments had been agreed to by the House of Commons; and nothing further was needed but the Royal Assent, which, in a case of this sort, was a formality. He anticipated it would be given next week. It seemed best to preface what he had to say that day by this statement. While the prospect of the change that lay before them had had its influence on all their proceedings during the past half year, the fact that a probability had become a certainty would have its influence on the way he and the proprietors would speak of matters connected with their Company that day.

A PROGRESSIVE BUSINESS.

Looking now for a few minutes into the doings of the past half year, and keeping in mind the fact that they had been selling gas at 2s. 8d. per 1000 cubic feet this year, against 2s. 9d. in 1908, he thought the proprietors could not fail to be satisfied that the Company were still in a sound position, and were continuing to increase their business in a very satisfactory manner, as they had so long been doing. The sales in the half year showed an increase of 5·48 per cent. over the corresponding half of 1908, in which, having been leap year, there was one more day than in the past half year. The receipts for gas and rental of meters were £5600 more than in the June half of last year. Coal and oil had cost less; and the alteration of the sulphur clauses had caused a marked reduction in the cost of purifying materials, as would have been noticed. The Directors had continued the charges for depreciation on the same scale as in former years, having for the half year written off £21,000; and, in the result, the profit carried to the net revenue account was £35,276, or only £565 less than a year ago. Comparing the result of the half year with that which ended last Christmas, they then had to draw £2950 from the undivided profits to pay the dividend. Now they could pay the dividend, and add £1264 to the undivided balance—a better result by £4214. The Directors had made contracts for coal for the future at a reduced price. But it was not easy at the moment to say how the values of residuals would work out. This half year they showed a material reduction from the sum they produced a year ago; and he was afraid they must anticipate some further reduction, but not, he thought, sufficient to counterbalance the saving that would be made in coal and oil.

CANNEL, A RELIC OF THE PAST.

He did not know whether any of the proprietors had noticed that one small item—a relic of the past, so far as this Company were concerned—had altogether disappeared from the accounts. The stock of cannel coal had been exhausted. The last purchase of this coal was a lot of 1000 tons in the year 1900. By the end of 1901, this stock had been reduced to 381 tons; in the next seven years, they used 220 tons; and the 160 tons left last Christmas, their Engineer (Mr. John C. Wright) had cleared off during the past half year, so as to get rid of it. The reduction of the illuminating power of the gas after the Company's Act of 1902, practically did away with the need for this stimulant.

SALIENT FEATURES.

He did not think it necessary at the summer meeting to trouble the proprietors with any long array of figures. He had quantities of them before him which were very interesting to study, and which showed a very satisfactory state of their affairs. But it would be impossible to make them interesting to the proprietors in a speech, nor did he think any really good object would be attained if he attempted to do so. He might just mention that the fixed capital had been reduced from 12s. to 11s. 9d. per 1000 cubic feet sold; that there was some increase in the carbonizing wages from a temporary cause, which would not recur; and that the number of ordinary consumers had increased since last year from 22,700 to 22,880, and slot consumers from 36,187 to 41,860.

THE AMALGAMATION—WEST HAM AND CALORIFIC POWER.

It would be quite understood that he had no report to make to the proprietors of any fresh undertakings entered upon, or any big plans for the future. The probability (which, as time went on, became more and more a certainty) that amalgamation with the Gaslight and Coke Company would become a fact, naturally prevented the Board entering upon considerations of that kind. When the Directors last met the proprietors, the Bill had passed the House of Commons; and its progress in the House of Lords since then had been a more rapid one. The Corporation of West Ham was the only opponent that appeared in the Committee room; and after a comparatively short hearing, the preamble was held proved. The only amendments of any consequence were two in favour of West Ham which the Gaslight Company agreed to—one making provision for a testing-station in Canning Town, and another extending the right to test the calorific power of the gas to be supplied in the West Ham district—the clause as passed in the House of Commons appearing to confine this to the London district. Neither of these changes was of special interest to the Company. No opposition was made in the House of Commons to agreeing to these amendments; and, as he had said earlier, the Bill now only awaited the Royal Assent. On Jan. 1, the stockholders of this Company would find themselves stockholders in the premier gas company of the world, with, as he confidently believed, even brighter prospects before them than they could have anticipated had they gone on as they were. Before the accounts for the current half year had been made up, this Company would have ceased to exist. When they were made up, the Gaslight Company would pay to the persons who were holders of ordinary stock of this Company on Dec. 31, a dividend for the half year at the rate at which—regard being had to the available profits of the Company—it would have been paid if the Amalgamation Act had not been passed; but the Directors would have no opportunity of coming before the proprietors with any report or accounts. It seemed, however, to the Board that, to have their last meeting with the proprietors now, would have been somewhat out of time, and that to say "Good-bye" at this meeting to those of the proprietors who had been good enough to attend the meetings, would have been like having a breaking-up party in the first month of the term. The Directors would have their ordinary work to do during this half year as usual; and probably there would be many matters to arrange and settle in preparing for the transfer of the one concern to the other. They therefore proposed to summon a special meeting nearly at the end of the half year, and to report to the proprietors then as to their proceedings, and the final arrangements for closing up the affairs of the Company. He should not therefore on this occasion bid the proprietors "Adieu," but only add that the business of the Company showed signs of a good increase since the end of the last half year; that the temporary arrangements made for carrying on the business of the Company after Mr. John Clark's death appeared to be working very well; and that there seemed every sign of the Company passing over to the larger Company in a healthy and vigorous state.

A PERSONAL MATTER.

Before he sat down, he wished to refer to one matter personal to himself. As the proprietors knew, the Act provided for one of the Directors of the West Ham Company having a seat on the Board of the Gaslight and Coke Company. His colleagues had done him the honour of expressing the wish that he should occupy that position; and, a vacancy having occurred on the Board of the other Company, it was suggested that he should be elected to fill this vacancy at once—thus in effect antedating his nomination under the Act. He was now, therefore, a Director of the Gaslight and Coke Company. He need hardly say that he did not accept the position without consulting his colleagues, and only accepted it after they had considered the matter and decided that the interests of the West Ham Company, and those concerned in it, were not in any way likely to suffer by his occupying for six months the dual position. He hoped he should not appear presumptuous if, after his short experience of the Directors of the other Company, he said that he thought the stockholders of this Company might be thoroughly satisfied that their affairs would, after the change, be in very good hands.

The DEPUTY CHAIRMAN (Mr. H. Cecil Pelly) seconded the motion; and it was unanimously adopted.

The CHAIRMAN proposed the declaration of dividends at the rates of 5 per cent. per annum on the preference stock and £5 7s. 6d. per cent. on the consolidated ordinary stock.

Mr. FRED. NICHOLSON, in seconding, remarked that he did so with a certain amount of regret, because this would be the last dividend to be declared and paid by the West Ham Gas Company. But, happily, they could go away fully confident that the amalgamation would prove beneficial to the stockholders and consumers of the Company.

The proposition was agreed to.

Mr. F. H. PILLEY moved a hearty vote of thanks to the Chairman and Directors for the manner in which they had conducted the affairs of the Company, more particularly in view of the arduous duties they had had during the last six months in anticipation of the amalgamation. He should like to couple with the motion the Secretary and officers of the Company, and especially their Engineer (Mr. Wright) who was suddenly called upon to bear the whole responsibility of the engineering department of the Company. The proprietors were glad to know he had carried out the work efficiently without calling in outside advice.

Mr. W. BEAUMONT seconded the motion; and it was heartily passed.

The CHAIRMAN, in the course of his reply, said there had naturally been a good deal of extra work during the half year. There had been a considerable amount of work outside the West Ham Board Room; for some of them, it had been transferred to the House of Lords and the House of Commons Committee rooms. But they were satisfied they had been working for the good of the Company, and for the good of the proprietors. The work had all been done with good will; and they were glad the result was as satisfactory as it had been. He was pleased Mr. Pilley said what he did as to the officers. They had worked hard and strenuously; and the Company had not had more thoroughly good work from them for many years. Mr. Wright was indeed deserving of special thanks from the proprietors in taking up the work as he did—not only the work in which he had assisted Mr. Clark for years, but the increased responsibilities that fell upon him at this special time. The work had been done very satisfactorily.

Both the SECRETARY and Mr. WRIGHT expressed appreciation, on behalf of themselves and their staffs, of the kind words spoken.

Mr. W. EDGAR, in the name of the proprietors, congratulated the Chairman on becoming a member of the directorate of the Gaslight and Coke Company, and expressed the hope that he would live long to retain the position.

The CHAIRMAN observed that, on this occasion, he could not help feeling a sense of personal obligation to those friends who had met him there for so many years. It tinged the satisfaction he felt with regret that he would have to do this so seldom again. At the same time, it was good of the proprietors to mention his position in the other Company; and he hoped that his occupying that position would help to settle matters between the two Companies during the next six months. He thanked them all most heartily.

The Gas Committee of the Walsall Corporation have decided to recommend an extension of the area of supply to include Pelsall and High Heath, at an estimated cost of £3365.

CROYDON GAS COMPANY.

Half-Yearly Report and Accounts.

In the report to be presented at the meeting of the Croydon Gas Company next Friday, the Directors state that the sales of gas exceeded those of the corresponding period of 1908 by 2·5 per cent. The number of consumers increased in the half year by 823, and that of stoves on hire by 1244; and 155 stoves were sold to consumers. In 1902, the system of maintenance by the Company of consumers' incandescent burners at an inclusive charge was introduced. The Directors have now decided that, as from the Michaelmas quarter, this service shall be given free; the only charge made being for the materials used. Free afternoon and evening lectures and demonstrations on cooking by gas have been given in Croydon, Purley, and Wallington. These have been well attended; and it has been proposed to hold further lectures in the autumn.

The accounts accompanying the report show that the total revenue was £116,358, of which £84,653 was derived from the sale of gas, £8646 from the rental of meters and stoves, and £22,943 from the disposal of residuals. A sum of £58,367 was expended on manufacture, and £17,041 on distribution; rent, rates, and taxes came to £4424; management cost £4192; and the total expenses (inclusive of £644 for the co-partnership scheme) were £89,258. The balance carried to the profit and loss account is £27,099; and the amount available for distribution is £29,176. The Directors recommend the payment of dividends at the rates of 14½, 11½, 10, and 5 per cent. per annum, all less income-tax, on the various classes of stock. This will absorb £22,624, and leave a balance of £6552.

The statements relating to the working show that, under the supervision of Mr. J. W. Helps, the Engineer and General Manager, 40,397 tons of coal and 552,221 gallons of oil were used during the half year to manufacture 659,317,000 cubic feet of gas, of which 620,752,900 feet were sold and 628,995,500 feet accounted for. The estimated quantities of residuals produced were: Coke, 24,238 tons; breeze, 6070 tons; tar, 476,452 gallons; ammoniacal liquor, 1,146,708 gallons—the make of sulphate being 484 tons.

Attached to the report is the "Warning" slip in regard to the issue of lists of shareholders to promoters of unsound companies to which reference was made in connection with the report of the Wandsworth and Putney Gas Company in the last number of the "JOURNAL."

PORTSEA ISLAND GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Saturday, at the Offices, Commercial Road, Portsmouth—Alderman Sir JOHN BAKER, M.P., J.P., in the chair.

The SECRETARY (Mr. H. A. Stibbs) having read the notice convening the meeting, the report and accounts for the half year ending the 30th of June were presented. The report showed that the revenue was £110,297, compared with £112,885 in the corresponding period of last year. The total expenditure was £90,772, against £96,569; and the amount carried to the profit and loss account was £19,525—an increase of £3200. Exclusive of a sum of £5960 in the extraordinary renewals account, the profit and loss account showed an available balance of £40,463, from which dividends were recommended at the rates of 13, 12, 10, and 5 per cent. per annum on the varying descriptions of shares and stock, less income-tax. The balance to be carried forward was £22,531. The Directors stated that the demand for gas had been well maintained, the number of consumers had again increased, and an additional number of cooking and heating stoves had been fixed. Regret was expressed at the death of Mr. Howard Charles Ward and at the resignation of Mr. Charles Cole, two of the Directors; and it was notified that to the vacancies Messrs. T. Scott Foster and T. H. F. Lapthorn had been elected. Though the Admiralty had required the removal of the jetty at the Flathouse works, the Company's right of access to the sea still remained; and satisfactory arrangements for continuing the delivery of seaborne coal had been made. The business of the Portsea Island Gas-Fittings Company, Limited, had been acquired, and the settlement had been concluded on the terms agreed upon at the preceding half-yearly meeting. The working statements showed that the quantity of coal and cannel carbonized was 54,327 tons, and 481,721 gallons of oil were used. The make of gas was 676,991,000 cubic feet, of which 629,789,900 cubic feet were sold and 649,031,300 cubic feet accounted for.

The CHAIRMAN, in moving the adoption of the report, briefly congratulated the shareholders on the continued normal trading by the Company, and subsequently eulogized the services which Mr. Cole and the late Mr. Ward gave to the undertaking for a long period.

The DEPUTY-CHAIRMAN (Mr. R. E. Hellyer) seconded the motion.

In the subsequent discussion, the report, which showed a lessened total income of upwards of £2000, was adversely criticized. Attention was also called to the manner of electing the Directors. One speaker remarked that the existing system was a perfect farce; and another complained that upon the Board there was not a *bonâ fide* representative who had been proposed by the shareholders—the whole of the members being the nominees of the Board itself, upon which the late Chairman had secured seats for both of his partners (one being the present Deputy-Chairman), while the present Chairman had secured a seat for his own son, a second for a brother Alderman, and a third for a political colleague for rendered services in the political world.

The CHAIRMAN defended the action of the Board as being in accordance with law, and said that if the present system were abandoned it would result in nothing but a scramble for the seats.

The resolution was then adopted.

The fees of the Auditors were raised from £80 to £100, on account of the alleged extra work put upon them in auditing the accounts of the Fittings Company.

Mr. H. B. MORRIS drew attention to the fact that by the absorption of this Company the members of the Board who were also Directors of the defunct Company were losing £150 a year in fees; and as the transfer of the business had added to their duties and responsibilities as Directors of the Gas Company, he proposed that their remuneration should be increased by the amount they had voluntarily forfeited.

No argument against the proposal was raised; but notwithstanding that the Auditor's fees had immediately before been increased on precisely the same grounds, the motion was outvoted by two.

A resolution authorizing the payment of the dividends recommended was unanimously agreed to; and the meeting terminated with the customary complimentary vote to the Directors and staff.

PROFIT-SHARING SCHEME AT GLOUCESTER.

The First Year's Working.

It will probably be remembered that a profit-sharing scheme was inaugurated last year by the Gloucester Gas Company; and on Monday, the 9th inst., the first annual meeting of members was held, at which a report of the first year's work was presented. After the meeting, members and their friends, to the number of 200 (including ladies), were entertained at tea in a marquee at the gas-works, situated at Hempsted, near Gloucester. Mr. J. H. Jones (the Chairman of the Profit-Sharing Committee) presided, and in proposing "Success to the Gloucester Gas Company's profit sharing and saving scheme, and health, happiness, and prosperity to all its members," expressed the regret felt by all that their Chairman, Mr. Vassar-Smith, was not present. His sympathies, however, were entirely with them; and he wrote saying that he felt sure the meeting must be most valuable, and productive of good results. Referring to the working of the scheme for the first year up to the 30th of June, Mr. Jones said the bonus distributable among the sharers in the scheme was £360 15s. 2d.—being 5 per cent. on the wages of each man during the past year. Altogether, 113 employees had taken part in the scheme—47 from the office and 65 from the works. But what they most desired was that the employees should help themselves. As they might know, in saving money, the great difficulty often was to make a start. The profit-sharing scheme gave them all this start. It was now open to them, and to their wives, to do all they could to increase the amount of savings. He was glad to say that 26 had already begun on their own account; and personal savings and interest during the past few months amounted to about £231. They had made a very good beginning, therefore, with the saving scheme as well as with the bonus scheme; and the two together totalled to £591 16s. 1d. He hoped the scheme would result in greater common efforts for the good of the Company and all connected with it, particularly the employees, and also including the Company's customers. It was to be hoped their example might bear fruit in their own district—say in Cheltenham, Stroud, and Cirencester. The toast was very cordially honoured. Votes of thanks were then passed to the Committee and Secretary, and also to the Chairman, and this portion of the proceedings closed. An excellent entertainment, arranged by Mr. W. S. Morland, followed, and an enjoyable evening was spent.

SALFORD CORPORATION GAS DEPARTMENT.

The Past Year's Working.

We have received from the Gas Engineer and Manager of the Salford Corporation (Mr. W. W. Woodward) the report of the Gas Committee and an abstract of the accounts of the gas undertaking for the year ended the 31st of March last.

The report opens with an expression by the Committee of their pleasure in recording that the usual growth in the number of consumers was maintained during the year. The sales of gas, however, showed a decrease equal to 3·52 per cent., probably due to the general depression in trade. The demand for gas appliances generally was very satisfactory, and the business in cooking-stoves increased. The works and plant were maintained in a thoroughly efficient condition; and a new bench of inclined retorts was completed at the Albion Street works. The quantity of coal and cannel carbonized was 162,930 tons; and the make of gas was 1,656,195,000 cubic feet, of an average illuminating power equal to 18·96 candles; the parliamentary standard being 18 candles within and 17 candles beyond the borough. There was a considerable decrease in the revenue from residuals last year compared with the year 1907-8. The price of gas was reduced on July 1, 1908, by 3d. per 1000 cubic feet to all ordinary consumers; and the quantity supplied for 1d. to those taking their gas through prepayment meters was increased from 28 to 30 cubic feet.

The abstract of accounts appended to the report shows that a sum of £10,917 net was expended for capital purposes in the twelve months; the principal items being £4241 for buildings and plant, £2770 for mains and service-pipes, and £3282 for sundries. The revenue account shows that the sale of gas produced £176,922; the rental of stoves, £1896; residuals brought in £51,987; and the total receipts were £231,126. The expenditure on the manufacture of gas was £129,283 (coal costing £91,850, and repair and maintenance of plant £16,527); on distribution, £15,440; and on management, £7645. The total expenditure (including £419 written off for bad debts) for the year was £171,738; leaving £59,388 to go to the profit and loss account. The total of this account was £60,724; and it has been disposed of as follows: Interest on mortgages and deposits and annuity payable to the district fund, £22,784; redemption of loans, £16,392; depreciation, £1500; transferred to the district fund account, £20,048.

Acting upon instructions from the Worsley District Council, Mr. J. P. Monks, the Law Clerk, is in communication with the different authorities in the gas supply area of the Salford Corporation in regard to the best methods to be adopted for obtaining the concessions named when the gas clauses of the Bill of the Corporation were recently before the Committee of the House of Lords.

EXTENSIONS AT THE WINSFORD GAS-WORKS.

Local Government Board Inquiry.

Last Tuesday, Mr. R. H. Bicknell, M.Inst.C.E., held an inquiry at Winsford in regard to an application by the Urban District Council for sanction to the raising of £1800 for the extension of the gas-works.

It was explained by the Gas Engineer and Manager (Mr. F. Sidwell) that since 1901 the make of gas had increased from 14 to 29 million cubic feet per annum; and the net price had been reduced from 4s. 2d. to 3s. 3d. per 1000 cubic feet for ordinary consumers, and from 4s. 8d. to 3s. 4d. for the users of prepayment meters. When the gas-works were acquired by the Council, their minimum capacity was 10 million cubic feet, and the maximum 15 million cubic feet per annum. During the past year, the gas made amounted to practically 30 millions; for the plant was much too small. It was proposed to put in four purifiers, 12 feet by 15 feet and 5 feet deep, which would increase the manufacturing capacity to 60 million cubic feet; also a tower scrubber, a set of annular condensers, with a similar capacity, and a new oxide shed. It was also mentioned that when the make of gas reached 60 millions per annum, the storage room would also be increased. In answer to the Inspector, Mr. Sidwell admitted that the erection of the oxide shed has been started; but the Clerk explained that no contract had been prepared, and the tender had been accepted subject to the approval of the Local Government Board. There was no opposition.

With the exception of the oxide shed, the contract for the extension has, we learn, been placed with Messrs. R. Dempster and Sons, of Elland.

METROPOLITAN WATER BOARD.

Sixth Annual Report.

We have received from the Clerk to the Metropolitan Water Board (Mr. A. B. Pilling) a copy of the sixth annual report, dealing with the work of the Board in the year ended the 31st of March last.

The report opens with some explanatory remarks on the constitution of the Board, and then sets forth its financial position. On the 1st of April, the capital debt was as follows: Metropolitan Water "A" Stock £6,060,165, interest £181,805; Metropolitan Water "B" Stock £35,579,761, interest £1,067,393; redeemable debenture stocks, mortgages, &c. (including £1500 London Bridge annuities), £7,232,138, interest £221,161—total stock, £48,872,063; interest £1,470,359. The annual interest charge of £1,470,359 was equivalent to 4·3d. per 1000 gallons of water supplied. The District Auditor certified that the surplus upon the accounts for the year 1907-8, being the excess of income over expenditure on revenue account, was £933 9s. 8d., which sum was applicable to the special redemption fund for the discharge of stock in respect of which a period of 100 years is prescribed by the Metropolis Water Act, 1902. Sums of £18,544 2s. 1d. and £2056 12s. 5d. of the Board's "B" stock were purchased for extinction in July, 1908, and January, 1909, respectively. The total amount standing to the credit of the Board at the end of the year under review was £81,474 12s. 3d., of which amount £72,245 1s. 4d. had been invested; leaving a balance of £9229 10s. 11d. uninvested. There is a further sum of £21,243 remaining uninvested, set aside to March 31, 1908, in respect of expenditure in anticipation of permanent borrowings, to which has to be added a contribution in respect of the year ended March 31, 1909, the amount of which is approximately £10,000.

The Board have minimized as far as possible the continuance of the old practice of cutting off the water as a means of enforcing the payment of water-rates, by the substitution of legal proceedings. The percentage of the total amount collected to March 31 last was 88·36, compared with 91·37 for the half year to March, 1908, and 84·16 for the six months to Sept. 30, 1908. The high figure of 91·37 per cent. was obtained before the temporary disturbance caused by the coming into operation of the Board's Charges Act of 1907.

Turning to the portion of the report furnishing particulars of the sources of supply, we find they continue to be four—viz., the Thames and the Lea; gravel beds adjoining the main stream of the Thames and other gravel beds at Hanworth; natural springs; and wells sunk in the chalk or other strata in the Lea Valley, on the north of the Thames, in Kent, and at certain other points south of the Thames. The Thames furnished 57·27 per cent. of the Board's total supply, compared with 55·98 per cent. in the previous year. The daily average quantity gauged at Teddington was 983·7 million gallons—a decrease of 306·1 million gallons compared with 1907-8. The daily average total abstraction from the river was 134·7 million gallons. The daily average natural flow at Teddington was therefore 1118·4 million gallons during the year, compared with 1412 million gallons in 1907-8. The total volume abstracted from the river was 49,179·2 million gallons, or 4473·8 million gallons more than in the year 1907-8, though that year contained a day more. There was, compared with the previous year, an increased average daily abstraction from the river of 12·5 million gallons. Of the 134·7 million gallons daily average quantity abstracted by the Board and the Suburban Companies, the Board drew 132·3 million and the Companies 2·4 million gallons. The percentage of the river's natural flow abstracted by the Board was 11·83, and by the two Suburban Companies 0·21, or 12·04 per cent., compared with the total abstraction of 8·65 per cent. in the year 1907-8. There was an increase in the total quantity abstracted from the River Lea by the Board equal to an average daily increase of 10·76 per cent.

The total volume of water supplied during 1908-9 was 81,823·9 million gallons, compared with 80,170·9 million gallons in 1907-8—an increase of 1652·9 million gallons. The average daily supply was 224·2 million gallons; the figure for 1907-8 being 219 million gallons. The southern district took the largest proportion of the total supply—viz., 27·70 per cent.—and the Kent district the smallest, 8·87 per cent. The eastern district consumed 19·21 per cent. of the total supply; the New River district 19·33 per cent., and the western district 24·88 per cent. The total estimated population supplied by the Board at the close of the year—viz., 7,046,814—represented 15·7 per cent. of the population of Great Britain and Ireland. Within the County of London there was an estimated increase for the whole of the Metropolis of 18,930, or 0·4 per cent., compared with the previous year; and the total increase outside the county was 51,089, or 2·32 per cent. There was an increased supply of 0·39 gallon per head per day as compared with the preceding year; while the average population is estimated to have increased 1·08 per cent., and the average number of services 1·24 per cent. For the whole area, the average daily supply per head was 31·94 gallons. In 1907-8, the average daily supply per head amounted to 31·55 gallons; in 1906-7, 32·84 gallons; in 1905-6, 32·31 gallons; and in 1904-5, 33·54 gallons. The total number of services supplied at the end of the year was 1,088,501—an increase of 12,390 over the preceding year. The average daily supply per service was 206·9 gallons, compared with 204·68 gallons; and the average population supplied per service was 6·48, against 6·49 in 1907-8. The increase in the number of services on constant supply during the year was 15,776, or 1·5 per cent. The proportion of supplies on the constant system at the close of the year was 97·74 per cent.

In the section of the report dealing with the storage reservoirs, reference is made to the commencement on April 11, 1908, of the Chingford reservoir, the capacity of which is approximately 3000 million gallons, and on the 24th of the following October of the Island Barn reservoir at East Molesey, which will contain nearly 1000 million gallons. These works were designed by Mr. W. B. Bryan, the Chief Engineer of the Board. The effective amount of storage and subsidence reservoir capacity for unfiltered water possessed and in use by the Board at the end of the year was 8844·7 million gallons; no addition having been made during the year. The total storage in existence, in course of construction, and authorized but not commenced was 14,844·7 million gallons. The following figures show the increases which have taken place under the Board in the active equipment of water-works since the transfer of the undertakings:

	Before June, 1904.	At March 31, 1909.
Storage reservoirs for unfiltered water	57	62
Acreage of storage reservoirs	886	1497
Capacity of ditto in million gallons	4077·6	8913·6
Service reservoirs for filtered water	74	82
Capacity of ditto in million gallons	241·5	255·4
Filter-beds	137	166
Acreage of ditto	140	164

In the section of the report dealing with the miscellaneous work, reference is made to the various legal decisions given in the course of the twelve months. There were 2277 cases referred to the Solicitor for proceedings to be taken, and 1890 summonses were issued, which resulted in payment in 1065 instances. Other cases were partly paid, abandoned, or left outstanding. The important work of the Director of Water Examinations (Dr. A. C. Houston) is also dealt with. He reports that "there is no doubt that the habitual use of stored water lightens the grave responsibilities of the Board as regards the safety of the Metropolitan Water Supply, and tends to create a sense of security among those who watch over the health of the Metropolis." Other matters touched upon are Dr. Mills's rainfall records, the uniform scales of charges, &c. The total rateable value of the Board's properties (including the mains) is £1,185,436, distributed as follows: Bucks, £786; Essex, £82,476; Herts, £16,766; Kent, £31,780; London, £638,353; Middlesex, £281,346; Surrey, £133,929.

BOLTON WATER-WORKS EXTENSIONS.

Local Government Board Inquiry.

At the Town Hall, Bolton, a short time ago, an inquiry was held by Mr. P. M. Crosthwaite, M.Inst.C.E., and Dr. L. W. Darra Mair, in regard to an application made to the Local Government Board by the Bolton Corporation for sanction to the borrowing of £15,700 for works in connection with the Dingle and Heaton reservoirs.

The Town Clerk (Mr. S. Parker) opened the case, and he was followed by the Water-Works Engineer (Mr. Lewis Mitchell, Assoc.M.Inst.C.E.), who furnished the necessary technical details. The area of the water supply of the Corporation comprises 42,080 acres; the area served having approximately a population of 290,000. The average daily consumption is 6,670,000 gallons, which works out to 23 gallons per head per day; 15 gallons being used for domestic and 8 gallons for manufacturing purposes. Mr. Mitchell stated that the water drawn from the Heaton reservoir was not satisfactory; and if this reservoir was to be retained it would be absolutely necessary to re-filter the water as it left the reservoir, and deliver it direct for consumption. The results obtained from the mechanical filters at Sweetloves and elsewhere were such as to justify the hope that the suggested alterations would render the water wholesome and palatable. The proposed works in connection with the Dingle reservoir included a filter-bed with an area of 800 superficial yards; a covered pure-water tank with a capacity of 180,000 gallons; a chalk mixing apparatus and a house for it; and a turbine with pump and injector for applying soda-ash to the filtered water. This water was of a higher standard than that obtained from the other sources, and in its origin was pure and good. It possessed lead-dissolving properties, however, and in the report of the Local Government Board it was stated that "it is not unlikely that if the water be continuously dealt with in adequate and properly-constructed filter-beds the filtration process will ordinarily suffice to deprive it of lead-dissolving properties." It was proposed to construct an additional filter, so that at least two filters should always be at work; and a covered pure-water tank, with a capacity of 180,000 gallons, which would increase the storage capacity for filtered water to 230,000 gallons. By thus meeting the fluctuations in the draught on the mains, the filters would be enabled to work regularly, and give a uniformly high efficiency. The Water Committee had consulted Professor Harold B. Dixon and Professor Percy Frankland on the proposed scheme; and the opinions expressed by them were entirely favourable. Mr. Mitchell described the proposed works, the methods of filtration, &c.

WATER QUESTIONS AT THE LEEDS HEALTH CONGRESS.

During last month there was held in Leeds a Health Congress, promoted by the Corporation and University, with the co-operation of the Royal Sanitary Institute and the Royal Institute of Public Health. In the Engineering Section (the President of which was Mr. C. G. Henzell, the Water Engineer to the Corporation) various papers bearing upon water supply were read and discussed.

Mr. R. Ross read a paper prepared by himself and Mr. J. Race, on "The Mechanical Filtration of Water Supplies," in which comparisons were given of the results obtained by the use of certain mechanical filters working under identical conditions. The authors pointed out that there were comparatively few places where different systems of filtration were in use for the treatment of the same water supply. The experiments extended over a period of three months, and were, of course, too short to be treated otherwise than as preliminary. They did not propose to deal with the efficiency of mechanical filtration for the purification of highly polluted water supplies; but the experiments were carried out with typical moorland waters for the supply of Burnley. The gathering-ground was chiefly rough pasture, and the soil more or less peaty. The drainage area was 1000 acres, the average annual rainfall 41·5 inches, the capacity of the reservoir 250 million gallons, the maximum depth 61 feet, and the area of reserve 38 acres. Except along the embankment, the reservoir was not pitched; it contained a considerable amount of peaty soil, and there was no bye-pass for storm water. In consequence of the unsatisfactory state of the water, of which only a million gallons per day could be dealt with by the existing sand filters, and owing to lead poisoning occurring from time to time, the Burnley Corporation decided that it was necessary to increase the means of filtration very considerably; and in the end they adopted Bell's and Mather and Platt's filters. Before the introduction of the mechanical filters, the water, which was almost invariably acid, was treated with lime at the rate of 120 lbs. per million gallons. More lime could not be used without any tendency to clog the filter-beds; and the amount taken up by the water was not always sufficient to overcome its plumbo-solvency. When mechanical filters were first used, lime was also employed; but it was not found satisfactory owing to its extremely limited solubility. It was then deemed advisable to use carbonate of soda as a neutralizer, together with a small quantity of aluminium sulphate as a precipitant. During the first two months' working, 120 lbs. of carbonate of soda per million gallons were used without sulphate of alumina. Samples were taken after standing all night in a long line of lead pipe situated in the town; and at the end of about a week's treatment no trace of lead could be found even in the first runnings. From the 2nd of June, sulpbate of alumina was added at the rate of 1·10th of a grain per gallon, and the carbonate of soda was reduced to 80 lbs. per day, as the acidity of the water in summer time showed a considerable decrease. Further samples taken in the town subsequent to the alteration had not shown any traces of plumbo-solvent action. The conclusions of the authors were that for certain classes of water mechanical filtration was sufficiently efficacious and far less expensive, both as regarded installation and working expenses, than sand filtration. Considering the results as a whole, there seemed to be little doubt that, if used under proper control, mechanical filters could be made to produce an effluent to all intents and purposes equal to that obtained from sand filters.

Mr. H. C. H. Shenton discussed the question of "The Sterilization of Water." He said this operation had been carried out satisfactorily in this country by the addition of chemical hypochlorite in very small quantities. This had been done more often than was generally known, as it was carried out unostentatiously where the water was found to be polluted, and the safety of the consumers had to be ensured promptly. At the present time the three practical methods in use were: (1) Ozone sterilization, as adopted by the Paris Municipality, at Nice, at Philadelphia, and at a great many other places of magnitude and importance abroad. (2) The chemical chlorine process, as applied to the Lincoln water during the epidemic, and in use elsewhere at the present time. (3) The electrolytic hypochlorite process, whereby a sterilizing agent of greater efficiency than chemical hypochlorite was produced by passing a current of electricity through salt and water, this agent being then applied to the water in very small quantities. This sterilizing agent was produced and used in large quantities for various disinfecting purposes with excellent results; but so far, in spite of its obvious economical advantages, it did not appear to have received the attention it deserved for the purification of water. At present there had been no exact comparative experiments made of the relative cost of these three methods, and it was greatly to be desired that such experiments should be made. One of the most important features of water sterilization was the enormous saving of expense to be effected by dispensing with filters and storage reservoirs used for purification purposes.

Dr. Samuel Rideal next dealt with the "Chlorine Sterilization of Polluted Waters." He said that an objection to the use of oxidizing agents for sterilization had always been the waste occasioned through their consumption by otherwise inert and harmless organic and inorganic matters. But with chlorine and hypochlorites the first rapid consumption was succeeded by slower action, which continued for some hours, and even days, attended by a germicidal power after free chlorine or hypochlorite had disappeared, due to the substitution products of the action of chlorine on ammonia and organic nitrogenous matters. Therefore it was found that ammonia and many nitrogenous substances, instead of diminishing the bactericidal power of chlorine and hypochlorites, actually increased it; thus securing great economy in the treatment of sewage and polluted waters. He said he had found that most polluted drinking waters could be sterilized by sodium hypochlorite in the proportion of one per million of available chlorine, and that after standing for about two hours no smell or taste of the reagent was perceptible. Therefore no subsequent filtration or other treatment was necessary.

Dr. A. C. Houston, the Director of Water Examination to the Metropolitan Water Board, sent a communication, on "Stored Waters," which was read in his absence by Mr. A. J. Martin. He said that filtration, after all, was either a purely mechanical or a bio-mechanical process, and must needs be fairly rapid to be adopted in practice. Storage, on the other hand, if sufficiently prolonged, not only reduced the number of microbes by sedimentation and by slow processes of natural destruction, but seemingly also brought about what might be termed a selective bacterial death-rate. It was by no means unlikely that a specifically polluted water might, if stored for a sufficient length of time, become quite harmless, owing either to total extinction of pathogenic bacteria, or to what practically came to the same thing—viz., loss by such bacteria of their specific properties. His conclusions were that storage reduced the number of bacteria of all sorts, reduced the amount of suspended matter, had a marked levelling effect on the totality of water delivered to the filter-beds, and tended generally to lengthen the life of the filters. He expressed the opinion that the use of stored water went far to wipe out the gravity of the charge that the chief sources of the water used in London were sewage polluted rivers, it rendered any accidental breakdown in the filtering arrangements much less serious than might otherwise be the case, and it lightened the grave responsibilities of the Water Board as to the safety of the London Water Supply.

The papers were discussed together.

Mr. J. Parker, the City Surveyor of Hereford, said the paper on "Mechanical Filtration" was most interesting to those who had to deal with the water supplies of cities, and were faced with the increasing demand for filters or for improved purity of the water. He had to deal with water pumped from the Wye, which certainly for a great portion of the year was quite pure. Occasionally, however, they had floods which made the water in the river the colour of cocoa. The works were on the top of a hill, and it was exceedingly difficult to increase the accommodation; and some years ago they had to resort to mechanical filters. These had worked very well, though the Medical Officer of Health was rather in favour of sand filters.

Dr. J. W. Miller, the gentleman referred to by the previous speaker, said that at times river water became murky, and it was useful in this connection to have mechanical filters which would remove the grosser particles, and so prevent the sand filters from becoming clogged. He thought, however, that reliance must be placed on sand filtration to remove bacteria, and that no chemical methods should be substituted for bacteriological methods of filtration.

Mr. T. Fairley (Leeds) said the water supply of York had been subject, under his direction, to bacteriological examination for some years past. The crude water from the Ouse, which received the sewage of a number of towns, might contain a variable number of bacteria—perhaps averaging 15,000 per cubic centimetre. The number was very considerably reduced in the subsiding reservoirs in which the water was stored; and afterwards, by sand filtration, they brought it down to what he called a negligible quantity. His experience, which was begun probably before Dr. Houston commenced his experiments, was satisfactory as tending to confirm his conclusions.

Mr. A. J. Price (Lytham) enquired whether, instead of storing the water, it would not be possible to bring about the same results at much lower cost by preliminary filtration. When he was at Worcester, the question arose of taking water during flood time; but the late Mr. Mansergh advised them to construct reservoirs to provide sufficient storage for three weeks' supply. This would have cost £20,000, whereas filters could have been installed for one-third of the cost. When Professor Dewar and Sir William Crookes gave evidence before the Royal Commission on the Metropolitan Water Supply, they expressed the view that there was no harm in taking water during flood time, if there was mechanical straining. He should like to know what that experience was at the present time.

Mr. W. Whitaker, F.R.S., said the papers showed the difficulty of hard-and-fast rules being applied in all cases, for they must be prepared for local variations. He was glad to hear from Dr. Rideal that chemists did not agree on these matters, for if they did they would override water engineers. Mr. Parker had said his river was pure; but he must have meant comparatively pure. If they were dealing with river water, they must do something to purify it; and it was the excellent purification work done in London that enabled the Water Board to supply really good water. It was satisfactory to know that by various processes water could be sterilized; but there was another method of avoiding polluted waters which should be resorted to whereever possible, and that was to get a supply which was not polluted.

Mr. Race, replying to the remarks made on the paper by Mr. Ross and himself, said that by the addition of suitable precipitants equally good results could be obtained by mechanical filters as with sand filters. Indeed, sometimes they were better. The Bolton results showed that both bacteriologically and chemically the effluent from the mechanical filters was distinctly superior to that from the sand filters, as with the latter the rate of filtration must be in proportion to the purification desired. The cost of mechanical filtration, even with the use of 2·3 grains of sulphate of alumina per gallon, was less, when interest, sinking fund, and maintenance were taken into account, than that of ordinary sand filtration. Mr. Shenton, replying on his paper, submitted that there was abundant evidence that sand filtration alone could not be relied upon for the removal of disease germs. Dr. Rideal said the City Engineer of Hereford would find some difficulty in increasing his storage capacity on the top of a hill, and suggested that he should look into the chlorine process.

Dr. C. J. Russell M'Lean next read a paper on the value of water analysis. His conclusions, based on experience in rural and small urban districts, were to the effect that present-day standards of analysis were unreliable as guides to wholesomeness of drinking water.

Mr. T. Fairley (Leeds), in the course of a paper on "The Water Supplies of Yorkshire," said the softest waters up to 7 grains of dissolved solids per gallon were generally found in the uplands west and north-west. Leeds, Bradford, Sheffield, Harrogate, Huddersfield, &c., had supplies comparable with those of Glasgow and Manchester. They were improved by storage and by filtration; and with due care they were safe for all domestic and manufacturing purposes. So far as he was aware, the use of a trace of copper salt to facilitate the separation of algæ and bacteria had not been tried in Yorkshire. The underground waters of the county varied exceedingly—depending on the nature of the strata and the depth from which they rose. The total dissolved solids ranged in amount from 7 to over 100 grains per gallon; and in their composition varied more widely than elsewhere in the country, or perhaps in Europe. The river waters were all more or less mixtures of ground and surface waters. As to future increased water

supplies, the available gathering grounds were being rapidly taken possession of, and future extensions must be met mainly by a more careful control of existing supplies.

Mr. C. Clemesha Smith, M.Inst.C.E., the Water Engineer to the Wakefield Corporation, described the methods adopted to prevent plumbo-solvency in his district of Wakefield. The source from which the water is derived is peat-covered moorland; hence the acidity of the water. Treatment by adding carbonate of soda was adopted as a temporary measure in 1892; and the author described the method and the cost of treatment. On the adoption of filtration in 1898, the question of the effect of sand filtration on the plumbo-solvent action of the water was considered, and many experiments were made with different sands. They showed that where filtration removed the affinity for lead when the sand was new, such action gradually decreased, and eventually the treatment must be combined with filtration. The use of limestone as an underlayer was proved experimentally to be of little value; while the use of lime or chalk, together with soda, was found to be detrimental. Treatment with lime and chalk before filtration was found, experimentally and on a large scale, to be insufficient; the water losing some of its alkalinity in passing through the filter-beds. It was decided to add chalk prior to filtration, and lime water after filtration. The chalk and lime treatment had been found quite as efficient as the soda treatment as regards the prevention of plumbo-solvency; it was also less costly, and did not give the water the "flat" taste which accompanies the soda treatment.

The Chairman said the papers they had heard covered a great deal of ground. In Leeds they had careful analyses, both chemical and bacteriological, of the water; but the city was rather well off in the quality of its supply. Some years ago, the question of mechanical filters was considered. They were troubled with algæ, and he wondered whether mechanical filtration might take it away, but believed it to be impossible. He had only recently begun to study the question of sterilization; but, from what he had read and heard, he was inclined to think that there was a great future for it. They found in Leeds, as Dr. Houston did in London, that water improved by storage.

QUALITY OF TRURO WATER.

A considerable portion of the address of the Chairman (Mr. A. C. Willyams), when moving the adoption of the report of the Directors at the recent half-yearly meeting of the Truro Water Company, was on the subject of the quality of the water supply of the town. In the course of the report, it was mentioned that during the spring a somewhat unsatisfactory analysis of the water was made, and it was thought advisable to caution consumers for a time to boil it before drinking it. But this caution had been withdrawn, in consequence of a favourable report having been received from Dr. J. C. Thresh. With the consent of owners of property adjoining the stream, the Directors had carried out improvements which they had every reason to believe would prevent pollution in future; and they had arranged to have an analysis of the water made quarterly for the present. The Chairman explained that there were upwards of 40 hydrants, the property of the City Council, which were of an old description, and which were not really dependable. The Company had several times called upon the city authorities to replace these hydrants by more modern ones. Some of the latter had been tried, and had worked out satisfactorily; but so long as the 40 to which he had referred remained, they would not be safe from the fear of contamination. They had put this as strongly as they could before the Council, but nothing further had been done. This was very unsatisfactory, because in a case of this sort, where there was the least trace of contamination, they should do their utmost to find the cause and remedy it as soon as possible. It was the duty of the Council, as it was the Company's duty, to remove all possibility of infiltration of impurities into their mains. They had had an analysis made as recently as the 18th of June by Dr. Thresh, who stated that the water was of satisfactory bacteriological quality; and in consequence of this analysis the Company withdrew the notice issued to consumers, at the request of the Council, to boil the water. He thought they would say they were justified in doing so.

The subject was discussed at some length at the meeting of the Council last Tuesday, on a recommendation by the Sanitary Committee, based on a report by the Surveyor, that the existing ball hydrants (numbering about 40) in the city should be replaced by spindle hydrants at the rate of 12 per annum. Mr. Jacob inquired if the ball hydrants had been condemned by the Surveyor or by any official other than the Engineer of the Water Company. The Surveyor said he thought they constituted a possible source of danger, but not to the extent that had been represented. Mr. Tonkyn proposed that the whole of the hydrants should be changed. Mr. Lodge seconded the proposition; and it was carried by 13 votes to 5. The Committee were afterwards instructed to obtain prices.

WATER SUPPLY IN SPAIN.

A Ten Years' Drought.

The report presented at the annual meeting of the Seville Water-Works Company, Limited, stated that the income in the year ending March last amounted to £37,218. After deducting working expenses, the cost of laying on services, and the service of debentures, the net profit for the year was £4708, compared with £5968 in the previous year. Adding the unappropriated profit at March 31, 1908—£13,422—the amount standing to the credit of profit and loss account was £18,130. The Directors recommended that a dividend of 2 per cent. be paid on the share capital (absorbing £5422), that £2582 be transferred to reserve (making it £5000), and that the balance of £10,125 be carried forward. The Directors regretted that the scheme referred to in their last report for supplementing the potable supply of Seville by filtered water from the River Guadalquivir had had to be withdrawn, owing to public opposition. The Water Commission having, however, now recognized that no more water could be obtained from the Guadaira Basin, it was hoped that negotiations would result in a solution of the difficulty.

The adoption of the report was moved by the Chairman (Mr. Cowley Lambert), who said the net profit for the year was some £1260 less than it was for the preceding year. This decrease was due to an increased expenditure, and not to a falling off in the water-rentals, which were actually a little more than the year before. Among the items to which he particularly referred was the one "expenses in connection with additional supply during drought," in which there was an increase of 17,798 pesetas. This was made up of an increase of 9000 pesetas for water taken by the Company from Santa Lucia, covering a period of six-and-a-half months; whereas the amount in the previous year, for the same purpose, only covered a period of three months. This made a great difference. A further amount of 5758 pesetas was for improved gas plant for the pumping-station at Las Aceñas. Then with regard to the expense in connection with the river water project, this was an item which had been rendered necessary by the endeavours to find a solution of the problem for a further water supply; and this covered the cost of negotiations in various directions carried on throughout the year. The Directors were very pleased to have Mr. Bithell, the Company's Engineer and Manager, present at the meeting. He was sure the shareholders would all agree with him (the Chairman) in congratulating Mr. Bithell upon having, in so short a time, formed and gained the goodwill and confidence of the authorities in Seville, though he had not yet been able to induce them to seek the advantage of a constant supply of filtered potable water from the river. His interviews and negotiations with the authorities had been carried out in the greatest friendliness and goodwill; and it was hoped the position he had already gained for himself in Seville would enable him ultimately to solve the problem of the water supply.

The motion was seconded by Mr. F. S. Jackson. There was a short discussion; and the Chairman, replying to a shareholder, stated that the drought in Spain had continued for ten years, and that it was getting worse and worse. If, however, the people of Seville would only be reasonable, and see with the Directors that the city could be supplied from the river with just as good water as London, Paris, or Antwerp, they could have all the water they wanted.

The resolution was carried; and the dividend recommended was declared on the motion of the Chairman, seconded by Mr. Easton Devonshire.

Other formal business followed; and, later, replying to a vote of thanks, Mr. Bithell remarked that there was a good future for the Company when he could get the filtered water business settled, as he hoped to do. Filtration, however, was not understood in Seville. It was difficult to convey to the people's minds that it was possible to filter dirty water, and make it pure and drinkable. However, he was hopeful that all opposition would die away. At the present time, the wells yielded only some 300 metres per hour; while the service required about 11,000 metres per hour.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In the Hamilton Town Council on Tuesday, the Gas Committee reported, with reference to the burgh Provisional Order, that objection had been taken by the Scotch Office to clause 11, which dealt with the appropriation of lands for gas purposes, and also to clause 19, in regard to the providing of fittings; and that the Town Clerk had explained that the Scotch Office were to submit a clause dealing with the profits of the gas-works, with a view to an annual contribution towards the rates. The Committee, while favourably inclined to the principle of applying a portion of the gas-works profits towards the reduction of the rates, were opposed to any statutory obligation being placed on the gas-works. With regard to clause 19, the Committee were of opinion that it should be dropped if the contractor's clause were insisted upon. The Town Clerk was instructed to report the views of the Gas Committee to the Committee in charge of the Order. The forecast of the Manager—Mr. J. Ballantyne—of profits for the current year showed a gross profit of £6101, as compared with £5049 last year. If the price of gas were reduced by 2½d. all over, he estimated that the above profit would be reduced by about £1000. The Committee recommended that the price be reduced by 2½d. per 1000 cubic feet—the rates to be 1s. 10½d. to ordinary consumers and 1s. 8d. for street lighting and power purposes, the reduction to take effect from the next survey. They also recommended that the price of gas supplied through prepayment meters should be reduced by 2½d. per 1000 cubic feet, and that the Manager should arrange, in lieu of altering the meters, to refund money when the collection was made. The Committee recommended that the capital cost of the coal-handling plant and the railway siding be carried forward as a floating debt, and be paid off by annual instalments of not less than £1000. The Committee were unanimous in recommending that the Manager's salary be increased by £20 a year; and that the Assistant-Manager's wages be increased to £3 5s. per week. After discussion, the increase to the Manager was granted; only two members of the Council voting against it. The other portions of the Gas Committee's report were also adopted. Hamilton now possesses the distinction of selling gas at a lower price than is charged anywhere else in Scotland. The gas is of 18-candle power. In Glasgow, where the gas is also of this power, and in Coatbridge, where it is over 20 candles, the price is 2s. per 1000 cubic feet. These are the lowest prices in Scotland.

It will be observed from the account of the proceedings at Westminster that the Coatbridge Gas Company have obtained their Provisional Order, notwithstanding the opposition of the Town Council. The opposition was almost hopeless; being little more than a policy of despair at the prosperity of the Gas Company. It might have been expected that the Corporation, considering the enormous benefit which the community have received at the hands of the Company, in the low price which they have charged for gas—for some years the cheapest in Scotland—would have had confidence in the Company, and have

relied upon their serving the town in the same reasonable spirit as heretofore; but a spirit of avarice seems to have possessed the Corporation, to the extent of their putting forward the claim that if the Company were to be allowed to supply gas which would cost less to produce, the community should benefit and not the Company. This view was not listened to by the House of Commons Committee, any more than it was by the Committee of the House of Lords. The other plea of the Corporation, that a calorific test of the gas should be imposed, is a somewhat puzzling one. Who suggested to the Corporation of Coatbridge that this test should be required of the Gas Company of so comparatively small a town? It is highly improbable that the idea originated in Coatbridge. It would rather appear to have been an exotic suggestion. It may have been an emanation from the Scotch Office, in which the guiding principle seems to be that their function is not to assist, but to harass, the promoters of local undertakings; or it may have been the suggestion of some consulted engineer who has advanced views on the matter of testing for calorific power. Whoever was the author of the proposal, he has failed; the Legislative tribunal having refused to impose, in the case of a small gas undertaking, a condition which has not yet been placed upon larger undertakings. The Company, which is one of the best managed concerns in the kingdom, have got their Order, with one or two trifling ameliorations; and there can be no doubt that, notwithstanding the views represented by the opposition, the Company will be found in practice to be as much alive as they have always been to the necessity for considering the welfare of the community, and that the community will not suffer, but, on the contrary, will benefit, by the new powers which the Company have obtained.

Some time ago, the villagers of Methven applied to the Perth Town Council for a supply of gas, and the Council remitted to their Gas Engineer—Mr. W. B. M'Lusky—to prepare a report on the subject. Mr. M'Lusky has reported that the laying of the main and the supplying of the gas present no difficulty—that, indeed, the situation is ideal from the gas supplier's point of view; and that, as the supply would be compressed at the holder station, a relatively small pipe would be sufficient, not only for Methven and district, but would also be available for compensating the Perth supply in the northern district, and for high-pressure supplies to factories for power or for intensified lighting. The whole cost of the work would not exceed £3500, and the fixed charge on this, for interest and sinking fund, would be £210 per annum. The sale of gas at Methven (which at present is less than half-a-million cubic feet per annum), at 4s. 3d. per 1000 cubic feet (the statutory increase of 4d. per mile on the Perth price), would bring out a deficiency. But with Almondbank, Ruthvenfield, and Pitcairnfield included, there should be a growing demand for gas in the district; and provided the sale amounted to 3,150,000 cubic feet per annum, the undertaking would pay. It was a scheme, however, which required further consideration; and Mr. M'Lusky suggested that the matter be delayed, and a canvass of the whole district carried out. The Gas Committee have agreed to delay consideration of the subject.

In the Newport (Fife) Town Council on Monday, Mr. Leitch, the Convener of the Finance Committee, reported that there was a surplus of £404 on the operation of the gas-works for the past year. The works, he said, were well managed, and an asset to the burgh, reflecting credit on the Manager (Mr. John F. Black) and the Convener. The price of gas had been reduced since the transfer from 5s. 5d. to 3s. 10d. per 1000 feet; and he thought there was a likelihood of a further reduction.

In the Wishaw Town Council on Tuesday, the Gas Committee reported upon the offers they had received for new plant for the gas-works. They recommended acceptance of the tender of Messrs. Parkinson and W. & B. Cowan, Limited, of Edinburgh, to fit up two 10-inch retort-house governors, for the sum of £139 13s. 6d.; and the tenders of Messrs. R. Dempster and Sons, Limited, of Elland, to erect a Livesey washer for £125, and a set of 12-inch pipe condensers, capable of passing 500,000 cubic feet of gas per day, for £264. The recommendations were adopted.

The Helensburgh Town Council on Tuesday had before them a report by the Gas Committee upon the improvement and reconstruction of the carbonizing plant and other extensions at the gas-works. After discussion, instructions were given for the preparation of specifications and the procuring of estimates as to the cost of the works, which, it is expected, will be about £12,000.

The Lighting Committee of the Lochgelly Town Council reported on Thursday that 18 new street-lamps had been erected. With regard to the offer by the Gas Company to supply light at the rate of 24s. per lamp per annum, it had been resolved to ask the Company to reconsider their offer. This was agreed to.

For the purpose of considering the question of public lighting, a meeting was held at Sandbank on Monday evening; and at it a Committee submitted a scheme in which provision is made for the erection of 32 acetylene gas-lamps of 50-candle power each. The initial cost was estimated at £130, and the annual cost at £52—equal to a rate of a penny in the pound. The meeting adopted the scheme; and resolved to ask the County Council to have a special lighting district formed.

Gas Poisoning at Newcastle-under-Lyme.—The mystery surrounding the death from gas poisoning of Elizabeth Botham at Newcastle-under-Lyme, on the 3rd inst., as noticed in the "JOURNAL" last Tuesday, was not solved at the inquest. The Jury found that death was due to poisoning by gas escaping from a gas-pipe, but that there was not sufficient evidence to show by whom the pipe was broken. Deceased's daughter said the woman had been more or less continuously drunk for four or five days. The gas-pipe leading from the main was hacked through close to the prepayment meter, and the money receptacle was also battered and the lock partly forced. The husband's brother, now on bail on suspicion of causing the woman's death, said the deceased hammered the meter with a hatchet on the night of Monday the 2nd inst., and the husband took the hatchet from her. The latter, who had to be removed to the Workhouse Infirmary, and was still dazed and ill, said his mind was a blank as to the occurrences of Monday evening and Tuesday morning. His opinion was that the deceased severed the pipe on Tuesday morning; but he did not know why.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 14.

Sulphate of Ammonia.

Notwithstanding the very heavy shipments in July, the market has been quiet, and parcels offered for tender have for the most part been disposed of at a slight decline on last week's prices. The closing quotations are, consequently, £11 per ton f.o.b. Hull, £11 2s. 6d. per ton f.o.b. Liverpool, and £11 5s. per ton f.o.b. Leith. Sales are reported to have been made abroad speculatively, at near the parity of spot prices, for delivery up to the end of the year, and even up to the spring months. Makers, however, though disposed to make concessions on recent quotations, are not willing to accept prices obtainable; so that the amount of first-hand business for delivery ahead has been in very limited compass.

Nitrate of Soda.

This article is again easier; the closing prices being 9s. 6d. per cwt. for 95 per cent., and 9s. 9d. for refined quality.

LONDON, *Aug.* 16.

Tar Products.

Markets have been quiet throughout the past week, but prices are fairly well maintained. Pitch has been very firm indeed, though not much business has been done, as makers decline to sell at anything like the equivalent of the prices at which buyers on the Continent are willing to pay. In South Wales, the consumers are holding off the market; being fully bought to the end of September or October next. Creosote is quiet; and there is little or no business doing in this article. Some of the manufacturers who have had occasion to sell have had to take rather low prices for their stock. Benzol 90 per cent. is quiet, and business has been done in the North at 5¾d., prompt delivery; while in London it is possible to buy at 6¼d. Fifty-ninety per cent. benzol is also easy. Business is reported in the North at 6¼d., and in London at 7d. Toluol is steady, but there is not much offering. Solvent naphtha is quiet in the North; but in London it is in fair demand. Carbolic acid is very weak, and business has been freely done at 10⅜d. on the east coast.

The average values during the week were: Tar, 16s. to 20s., *ex* works. Pitch, London, 29s. 3d. to 29s. 9d.; east coast, 29s. to 29s. 6d.; west coast, 28s. 6d. to 29s. 6d. f.a.s. Mersey ports, 28s. 3d. to 28s. 9d. others. Benzol, 90 per cent., casks included, London, 6½d. to 6¾d.; North, 5¾d.; 50-90 per cent., casks included, London, 7d. to 7¼d.; North, 6¾d. to 7d. Toluol, casks included, London, 8¼d. to 8½d.; North, 7⅜d. to 8d. Crude naphtha, in bulk, London, 3¼d. to 3½d.; North, 3d. to 3¼d.; solvent naphtha, casks included, London, 10⅜d. to 11d.; North, 9⅜d. to 10d.; heavy naphtha, casks included, London, 10¼d. to 10¾d.; North, 9¼d. to 9⅜d. Creosote, in bulk, London, 2⅜d. to 2 15/16d.; North, 2⅜d. to 2⅝d. Heavy oils, in bulk, 2⅝d. to 2 15/16d. Carbolic acid, 60 per cent., casks included, east coast, 10½d. to 10¾d.; west coast, 10¼d. to 10½d. Naphthalene, £4 10s. to £8 10s.; salts, 35s. to 37s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1¼d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been quiet throughout the past week. The Gas Companies still maintain their prices at £11 7s. 6d. It is possible, however, to buy outside makes on Beckton terms at £10 18s. 9d. to £11; while the same figure is ruling in Hull. In Liverpool, business is reported at £11 1s. 3d. to £11 2s. 6d.; and in Leith £11 5s. to £11 6s. 3d. is asked, but business is difficult at this figure.

COAL TRADE REPORTS.

Northern Coal Trade.

There has been a return to more normal production of steam coals in the North, and with that the range of prices has been lowered; but some other kinds of coal keep scarce and firm. Best Northumbrian steams are from about 12s. to 12s. 3d. per ton f.o.b., second-class steams are 10s. 6d., and steam smalls are now more plentiful at from 5s. to 6s. 3d. In the gas coal trade, some sectional strikes have kept the supply rather limited, and thus have maintained the values. Durham gas coals of the usual kinds have been quoted, according to quality, from about 10s. to 11s. 3d. per ton f.o.b.; and for "Wear specials" up to 11s. 9d. has been the current price. A contract has been allotted to Durham collieries for some 16,000 tons of good gas coal, for delivery over twelve months, and the prices are much the same as those that are now currently quoted. There does not seem, therefore, to be much alteration expected soon in the price of gas coals, though there should be a more pressing demand as the autumn goes on. Coke is steady; and gas coke maintains its price, though a little more plentiful, at from 12s. 9d. to 13s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade is in a depressed condition, on account of the large stocks held by manufacturers. Orders are scarce; and in many instances the miners are getting longer holidays than usual. It will take some time before the effects of the threatened strike disappear. The prices quoted are: Ell 9s. 6d. to 10s. 6d., splint 10s. 9d. to 11s., and steam 9s. 6d. to 9s. 9d. per ton f.o.b. Glasgow. The shipments for the week amounted to 303,606 tons—an increase of 90,580 tons upon the previous week, but a decrease of 39,892 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,780,513 tons—an increase of 530,592 tons upon the corresponding period.

Effect of the Coal Mines (Eight Hours) Act.—It is reported that the export returns of the coal trade disclose a rather disquieting sequel to the coming into operation of the Mines (Eight Hours) Act. The foreign shipments of coal from Cardiff, Newport, Swansea, and Port Talbot in July totalled about 1,985,000 tons—a decrease of nearly 360,000 tons compared with July last year. To this must be added fully 150,000 tons decrease in coastwise trade and bunker shipments.

West's Coke-Conveyors, &c.

During the last month or two several large contracts have been placed with West's Gas Improvement Company, for installations of coke conveying and storing plants. They have in hand a contract for equipping the new inclined retort-house at the Gaythorn Gas-Works, Manchester, with a conveyor which will deliver the coke into skips to be handled by an existing coke-storage plant. The West coke-conveyor has already been in operation in an adjacent retort-house for a number of years. They have also a large contract in hand for a coke-conveyor and coke-storage scheme for the reconstructed retort-house at the Croydon Gas-Works, and have also contracts in hand for coke-conveyors for the Sundby Gas-Works, Copenhagen, and the Turin Gas-Works. They are also supplying their coke-conveyor for conveying ashes at the electricity station at Amsterdam. In addition to these contracts, they have also contracts in hand for extensive schemes of coal-conveying machinery, including gravity-bucket conveyors for the Burnley Gas-Works, and the Formby power station of the Lancashire and Yorkshire Railway.

Theft from Gas-Meters at Rotherham.

At the Rotherham Police Court last Tuesday, George Roberts (21) was charged with stealing four sums of money from prepayment gas-meters belonging to the Corporation. The accused was one of a number of thieves who have given much trouble lately. Mr. P. E. Cooper, Solicitor, from the office of the Town Clerk, prosecuted, and said that in the present year, up to the 31st of July, there had been 94 meters broken into, money amounting to £12 abstracted, and damage to the extent of £3 10s. done to the meters. Most of the robberies had taken place from empty houses. Great difficulty had been experienced in bringing home the offences to the persons who had committed them; and he asked the Bench to impose the heaviest penalty on the prisoner, so that it would act as a deterrent to others. Several witnesses were called who had identified the prisoner. The detective sergeant who arrested Roberts said he found in his possession a skeleton key, an ordinary door key, a bunch of keys, a small box containing cuttings from newspapers, and a list of empty houses in the borough. Prisoner said he was very sorry, and made a promise to refund the money. The Chief Constable said Roberts had a very bad character, and referred to convictions against him for theft and other offences. Mr. C. B. Clark, the presiding Magistrate, described the charge as one of the most serious ever brought before the Court. Prisoner, a young man, seemed to have made up his mind to live by stealing from gas-meters. He had only a short time previously come out of prison after serving six months; and it appeared as if no lesson would ever do him any good. He was sentenced to two months' imprisonment on each charge, or a total of eight months.

Bankruptcy of Mr. Charles Scott-Snell.

In the London Bankruptcy Court on Monday last week, a meeting of creditors was held before Mr. W. Boyle, Official Receiver, under a receiving order made against Charles Scott-Snell, of No. 25, Victoria Street, Westminster. The accounts showed liabilities £13,588, of which £8588 is unsecured, and assets a doubtful book debt of £75. The debtor stated that prior to 1895 he was engaged on various electrical and incandescent gas matters. In 1839 or 1900 he invented a gas-lamp, and sold the patent to the Scott-Snell Gas-Lamp Company, Limited, with a nominal capital of £1,000,000. As vendor he received £259,000 in shares and £4000 in cash, and was appointed Director at a remuneration of £500 a year. Owing to insufficient working capital, the Company was wound up three years later, and the assets did not realize sufficient to meet the claims of the debenture holders. Since then he had invented a steam-boiler, a vacuum gas-compressor, and an apparatus for public amusement in the shape of a patent captive aëroplane. He sold the last-named invention to a company; but it appeared that it had been anticipated, and the share consideration he received was valueless. When he was a Director of the Gas-Lamp Company, and worth £50,000, he bought an estate at Wimbledon for £8000; the money being advanced by the bank on the security of his shares in the Company and a mortgage on the freehold. Owing to depreciation in the value of the shares and property, the bank were now unsecured creditors for £3000. The debtor attributed his present position to the failure of the Gas-Lamp Company. The case was left in the hands of the Official Receiver.

Gas Supply at Marseilles.—According to the report presented to the shareholders of the Marseilles Gas and Electricity Company at their last meeting, the quantity of gas sold in the past financial year amounted to about 1201¾ million cubic feet; representing an increase of 13·17 per cent. compared with the previous year. The number of consumers was 9383, against 6895 in 1907, 5840 in 1906, and 2890 in 1905. The greater numbers were due to a reduction in the price of gas, which encouraged its use for heating and culinary purposes. The net profit, however, was about 1d. per 1000 cubic feet less last year than in the preceding twelve months. The total net profits amounted to 587,942 frs. (£23,518).

Buenos Ayres Gas Amalgamation.—With further reference to this matter, alluded to last week (p. 395), the "Financial News" states that an official circular will shortly be issued to the shareholders of the three Argentine Gas Companies, explaining to them the terms of the proposed amalgamation. The full details of the scheme will be published as soon as possible after the arrival in London of various official documents which are now on their way from Buenos Ayres. Meanwhile, the terms may be stated as follows in relation to the present capital of the Companies: In the case of the Buenos Ayres (New) Gas Company, it consists of £700,000 in ordinary shares and £250,000 in 4 per cent. debentures; and the Company will receive £500,000 in the Primitiva Company's 5 per cent. preference shares and £250,000 in ordinary shares. The River Plate Company's present capital is £1,500,000 ordinary, of which £1,000,000 has been issued; and there are £312,500 of debentures. The Company will receive £1,000,000 in preference and £500,000 in ordinary shares of the Primitiva Company.

Gainsborough Gas Undertaking.

The accounts of the Gas Department of the Gainsborough District Council for the year ended the 31st of March last, which were presented by the Chairman of the Gas Committee (Mr. W. Drust, J.P.) at the meeting of the Council on Monday last week, showed a gross profit of £5080, and a net profit of £118. During the year, nearly £1000—a very heavy item—had been spent on the renewal of mains and services. The conversion of the street-lamps from the flat-flame to the incandescent system was completed during the year; and the improved lighting is highly appreciated. As the result of trade depression, the revenue from the sale of gas showed a decline of £245, and the receipts from the sale of residuals were £228 less than those for the year 1907-8. The quantity of gas made was 85,820,000 cubic feet—a decrease of 3,623,000 cubic feet. The coal carbonized amounted to 7627 tons, or 353 tons less than in the preceding year. The make of gas per ton of coal carbonized, however, was 11,252 cubic feet—an increase of 44 cubic feet. Gas-cookers are still in brisk demand; the number in use being 852, a rise of 152; and more people are adopting gas for lighting their houses. The number of gas consumers is 2584, or 216 more than before. With a view to further popularizing the use of gas, the Committee have decided to reduce the price to all consumers by allowing an additional 2½ per cent. discount, making a total of 7½ per cent. for the prompt payment of accounts; the reduction to take effect in the accounts for the quarter ending the 30th prox. The Committee and the Gas Manager (Mr. J. Baldwin) were congratulated on the extremely satisfactory results obtained during the past year, notwithstanding the very heavy expenditure in renewing mains and services and the slight falling off in sales of gas and residuals.

Canadian Natural Gas.—News has been received that the great gas-well unexpectedly drilled on the Tilbury oil-property of the East Tilbury (Canada) Company, at London, is now giving an increased production of 5 million cubic feet a day. Further drilling for oil is impossible, owing to the large volume and high pressure of the gas; and it is thought that the Company will find it necessary to go into the gas business. Many oil-field towns in Canada are, as is well known, lighted by means of natural gas.

Fatal Gas Explosion at Southport.—Last Wednesday, a fatal gas explosion occurred at a grocer's shop in Southport. It appears that customers had remarked on the smell of gas in the premises, and the proprietor of the business, Mr. Isaac Nuttall, entered the front sitting-room carrying a lighted taper. The result was an explosion which not only did considerable damage to the premises, but caused the death of a girl ten years of age, who was thrown with great force against a wall. Though conscious when medical assistance arrived, she died shortly afterwards—it is thought struck with a brick. Mr. Nuttall was severely burnt, and had to be removed to the Infirmary.

Mitcham and Wimbledon Gas Company.—At the half-yearly meeting of this Company on the 31st inst., the Directors will report a satisfactory increase in the sales of gas in the six months ending the 30th of June, compared with the corresponding period of last year; but the decline in the markets for residuals has adversely affected the revenue therefrom. The half-year's working produced a profit of £11,455; and the sum available for distribution (£16,793) enables the Directors to recommend the payment of the increased dividend at the rate of 5¼ per cent. per annum to which the proprietors are entitled under the sliding-scale, consequent upon the reduction of 2d. per 1000 cubic feet in the price of gas.

Use of Tar on Roads.—At the last meeting of the Malling Rural District Council, the Surveyor (Mr. Marshall) reported that he had tried all round the district to get tar for finishing off the tar-painting of the roads, but had not succeeded; the County Council having the first chance. They required another 80 barrels to finish tar-painting in Snodland, and about 140 barrels to finish the whole of the work. Early on Monday morning last week, a tar-boiler belonging to the Llandudno Urban District Council, which was being used in connection with the tar-spraying of the roadways for the prevention of dust, caught fire, and the flames spread to the recently-tarred roadways, some considerable area of which was blazing for a time.

Cost of the New Water Scheme for Stockport.—During the discussion, at a recent meeting of the Stockport Town Council, on the Water Committee's accounts, Mr. Brewster declared that the town had lost on the Kinder water scheme a sum of £100,000, or about equal to the cost of their new Town Hall. The abandonment of the original scheme at Kinder, for the substitution of the present works, had cost £168,000, of which amount about £68,000 had been used in connection with the present scheme. He alleged that a great deal of the money had been lost by reason of mismanagement and want of foresight on the part of certain members of the Council. Alderman Bell, in reply, admitted that a mistake had been made; but he said it was not right to assert that the whole of the £100,000 had been wasted. Now that the mistake had been rectified, they would have a reservoir that would be perfectly safe.

Condition of Gas-Mains at Halesworth.—At the monthly meeting of the Halesworth Urban District Council on Monday last week, a letter was read from the Secretary to the Halesworth Gas Company to the effect that the Company were desirous of testing their mains and pipes, with a view to the discovery of leakages, and asking the permission of the Council to drive down iron bars in the roads, and, where found necessary, to break up the roads, in order to renew or repair the mains or pipes—undertaking to make good the roads so broken up to the satisfaction of the Surveyor. In the discussion that ensued, the opinion was expressed that the gas-mains throughout the town were in an unsatisfactory condition, and that practically all of them needed relaying. It was eventually resolved—"That, in the opinion of the Council, all the gas-mains in the town require to be renewed, and consequently they cannot accede to the application; but that the Council would be prepared to favourably consider a scheme for relaying all the mains in sections."

Slot-Meter Padlocks.

Mr. H. Mitchell writes (under date of Aug. 12): My attention has been called to your issue of the 3rd inst., where you have a notice of Mr. R. B. Reeves' "Patent Slot-Grip Bolt" to my M & M patent lock. You say Messrs. George Glover and Co. (who are the agents for the Reeves patent) "have adapted the bolt to their 'M & M' patent four-lever lock." This is not their patent; it belongs to me. They are the agents only. Will you kindly put this right?

Buenos Ayres Water Supply.—According to a paragraph in "The Times," a Bill has been presented to Congress by the National Executive for the authorization of the extension of the sanitary works of Buenos Ayres. It is proposed to expend a sum of £3,600,000 upon the water supply; the new works to include an intake tunnel, filters, new pumps, and piping. The necessary funds are to be raised by the issue of special bonds bearing 5 per cent. interest and 1 per cent. amortization.

Manchester Corporation Gas-Coal Contracts.—Tenders for the supply of the coal required during the ensuing year by the Gas Department were under consideration at a special meeting of the Gas Committee of the Manchester Corporation held last Wednesday under the presidency of Alderman Gibson, the Chairman. The orders placed for coal by the Corporation total between 350,000 and 400,000 tons; and the accepted tenders being at a figure of nearly 1s. per ton less than those of last year, the saving effected is estimated at a little short of £14,000. The new contracts take effect from the 1st prox.

Plymouth Water Supply.—At the meeting of the Plymouth Town Council on Monday last week, Mr. C. H. Tozer, on the presentation of the minutes of the Water Committee, complimented the Water Engineer (Mr. F. Howarth) on his saving £2513 on his estimate for the trunk main. Mr. Bond, on a report that "any extension of the existing means of conveying the water between the Burrator and Roborough reservoirs should be on the lines of rendering the leat permanently serviceable," expressed the hope that it did not mean anything like the enormous capital outlay foreshadowed earlier in the report, amounting to £40,000. The pipes had never been intended as a substitute for the leat; and a great deal of money had already been spent on it with this object in view. It was much easier to keep the leat in repair than to make it serviceable after it had got into a state of disrepair. The Committee looked upon the pipes as supplementary to the leat, which they held should be maintained in a condition of effective service. Mr. S. Stephens moved that the minute should go back to the Committee for further consideration, and expressed the opinion that they should deal with the question of the leat boldly. Mr. Jacobs seconded this proposition. The Chairman of the Committee (Mr. Winnicott) said they agreed with Mr. Bond. The minute was accordingly referred back.

Proposed Water Supply for Hope.—A Local Government Board inquiry was held last Friday before Mr. A. G. Drury, at the Hall Hotel, Hope, into an application by the Chapel-en-le-Frith Rural District Council for sanction to borrow £4280 for water supply purposes for Hope. It was stated that a rate of 1s. 10d. in the pound would be required to pay off the loan in 30 years, principal and interest, at 3½ per cent. exclusive of the water-rents and maintenance. Mr. C. R. Brady, of Stockport, the Engineer for the scheme, stated that it was proposed to obtain the water from Jagger's Clough, four miles away, and pipe it to the village. Dr. Bennett, the Medical Officer of Health, said he had long advocated the provision of a water supply as being necessary for Hope. An alternative scheme less costly was pleaded for by Mr. Laycock, representing the Parish Council, and others; and the Inspector promised that the matter should be carefully considered.

Emergency Water Supply for Guildford.—At the meeting of the Guildford Town Council last Tuesday, reference was made to correspondence which had passed between the Water and Baths Committee and the Woking Water Company with regard to an arrangement under which the Company will supply the town with water in case of emergency. It was proposed that the Corporation should pay a minimum of £50 per annum as a fixed charge, in consideration of the Company allowing the necessary connections to be made to their mains at the expense of the Council; that all water supplied should be passed through meters, and be paid for at the rate of 1s. per 1000 gallons; that the Corporation should pay the annual charge for meter-rents in accordance with the Company's scale; that the agreement should be for three years; and that the Company should reserve the right of priority to the supply of water in their own district in case of necessity. The Town Clerk (Mr. F. S. Miller), on behalf of the Committee, recommended that an agreement should be made embodying the foregoing proposals; and, after some discussion, this was decided upon.

Reduced Prices for Gas at Halifax.—It was briefly mentioned in the last number of the "JOURNAL" that the price of gas at Halifax had been reduced. According to the statement of Mr. Collinson, when moving the adoption of the revised scale of charges at the meeting of the Council at which the reduction was sanctioned, the new charges within the borough for lighting purposes vary from 1s. 11d. to 2s. 1d. per 1000 cubic feet, with an intermediate price of 2s., and for gas-engines from 1s. 10d. to 1s. 8d., with an intermediate price of 1s. 9d. These prices are to be subject to an allowance of 1d. per 1000 feet, if the accounts are paid within the prescribed time. This arrangement does away with the sliding-scale of discounts at present in vogue. In the case of prepayment meter consumers, the reduction will be 1d. per 1000 cubic feet. The difference in the price charged to consumers beyond the borough has hitherto been 10d. per 1000 cubic feet. This has been reduced to 7d.; so that the prices will now be 2s. 6d. to 2s. 8d. per 1000 cubic feet for lighting purposes, and 2s. 5d. to 2s. 3d. for gas-engines, subject to the 1d. per 1000 cubic feet discount. With regard to the altered charge to prepayment meter consumers, it is intended to return the difference of 1d. when the money is collected.

The name which denotes the highest order of excellence—

Eureka

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

Labour Co-Partnership.—Statistics have been published by the Labour Co-Partnership Association in regard to the progress of the movement. In 1883 there were only 15 societies working on labour co-partnership principles, and the capital involved was £103,436. The number of societies increased to 125 in 1903; but it now stands at 112. These societies, however, now have a capital of £1,941,112, against £1,649,859 five years ago.

Wombwell Gas and Water Supply.—According to the report of the Gas and Water Engineer of the Wombwell Urban District Council (Mr. R. Dawson Walmsley, B.Sc.), the gross profit realized by the Gas Department in the year ending March 31 last was £2366; the net profit being £876. The reduction of 3d. per 1000 cubic feet and the abolition of meter-rents, which came into operation at the beginning of the financial year, reduced the net profit by £488. On the basis of the previous year's price, the gross profit would have been £2854, and the net profit £1364. The working results showed a very decided improvement; the make of gas per ton of coal having been 11,010 cubic feet, compared with 9923 cubic feet in 1907-8. There was an increase of 3,366,000 cubic feet, or 8 per cent., in the gas sold, and a reduction of 4½ per cent. in the quantity unaccounted for. At the end of the year there were 2768 prepayment and 499 ordinary consumers on the books. The gross profit of the Water Department was £292; and the net profit £96. For the year 1906-7, there was a loss of £345, after paying £273 for loans and interest.

According to the correspondent of "The Times" at Stockholm, though the labour troubles in Sweden are causing great inconvenience—even the newspapers having suspended publication—the towns are lighted, in spite of the strike of the men at the gas and electricity works. A telegram from a private source in Stockholm received by our contemporary on Monday last week was to the effect that there was no danger of the gas or electricity supply being cut off.

The Council of the Institution of Junior Engineers are desirous of ascertaining if any of the members would be likely to join the Technical Reserve of the Territorial Force in connection with the Institution, supposing the conditions of service were suitable; and the Secretary (Mr. Walter T. Dunn) is sending out circulars to learn the views of the members on this matter, and also to obtain information as to whether any of them are already enrolled, and particulars of their rank and length of service.

In view of the importance to gas engineers and managers of the economical transportation of material, their attention may be called to a small pamphlet on "Ropeways and Cableways" issued by the Gilbert Little Company, Limited, of Bradford. Illustrations are given of the aërial wire ropeway erected by them for the Dalton Main Colliery Company, Limited, at their Silverwood Colliery. It is 1100 feet in length, and is built on the single-rope system; the coal carried being 50 tons per hour, running at a speed of 300 feet per minute.

APPLICATIONS FOR LETTERS PATENT.

17,862.—Kreidl, I., and Heller, G., "Mantles." July 31.
17,877.—Butterworth, A., "Gaslight appliance to enable the occupant of a bed to have control over the light while in bed." Aug. 3.
17,920.—Yates, H. J., "Gas-fires." Aug. 3.
17,921.—Akt.-Ges. Brown, Boveri, et Cie., "Controlling steam or gas turbines." Aug. 3.
17,954.—Goss, W. E., "Acetylene gas-generator." Aug. 3.
17,976.—Rees, I., "Internal-combustion engine." Aug. 4.
17,979.—Bradley, R., "Fittings for globes and chimneys for gas and electric lights." Aug. 4.
18,013.—Stubley, C. H., and White, F., "Separating dust and the like from air or gases." Aug. 4.
18,024.—Collins, W. F., "Gas-fired kilns." Aug. 4.
18,101.—Sprang, F. H., "Slip-on unions for pipes." Aug. 5.
18,107.—Foster, H. F., "Internal-combustion engines." Aug. 5.
18,119.—Foord, J. K., "Internal-combustion engines." Aug. 5.
18,123.—Tigges, F., "Gas-producers." Aug. 5.
18,139.—Bradley, R., "Globes and chimneys for gas lights." Aug. 6.
18,140.—Burt, P., "Internal-combustion engine." Aug. 6.
18,175.—Eady, L. H. & E. W. H., and Cash, J., "Incandescent gas-lamps." Aug. 6.
18,200.—Smith, N., "Carburettors for the manufacture of air gas." Aug. 6.
18,206.—Palmer, T. C., and Stead, J. C., "Deodorizing carbon dioxide." Aug. 6.
18,229.—Brocklesby, H., and Samuel Gratrix, Jun., and Bro., Limited, "Incandescent gas-burners." Aug. 7.
18,243.—Mowat, J., "Igniting and extinguishing gas-lamps." Aug. 7.
18,260.—Helps, J. W., and Pateman, J. W., "Mouthpieces of gas-retorts." Aug. 7.

The Directors of Crossley Bros., Limited, announce an interim dividend of 2 per cent. (actual), against 2½ per cent. last year.

At the Newcastle-under-Lyme Police Court last Tuesday, Edward Botham, who was charged, on suspicion, with contributing to the death of his sister-in-law by severing a gas-pipe and causing a leakage of gas into her house, was brought up again before the Magistrates, and discharged. A report of the inquest on the unfortunate woman appears elsewhere.

The Lighting Committee of the Dublin Corporation will, at the next meeting of the Corporation, submit a report advising the temporary appointment of Mr. Henry F. Cotton as City Gas Examiner in place of his father, who is now very ill; and they will add a recommendation that Mr. Cotton, jun., be temporarily appointed to assist his father in the general duties of the office.

APPRECIATIONS.

SERIES No. 7.

A Gas Engineer, Manager, and Secretary writes:—

"My directors are very pleased with the manner in which you have served them during the last 3 years . . . . and they have authorized me to procure **ALL OUR REQUIREMENTS** in Gas Stoves, Meters, &c., from you as heretofore."

Our Up-to-Date Manufactures Merit Your Attention.

THE RICHMOND GAS STOVE & METER CO., LTD.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.
London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. *General Offices and Works: Warrington.*

John Wright and Eagle Range, Limited, have paid an interim dividend for the half year at the rate of 15 per cent. per annum; being the same as a year ago.

Considerable alarm was caused last Saturday morning by an explosion beneath the pavement in Spa Road, Bermondsey, within a few yards of the scene of a similar occurrence last December. One of the boxes connected with the Bermondsey electric light system, situated just outside the entrance to the public baths, was blown off, and about a dozen paving-stones were thrown in various directions.

A new Water Company is to be formed for the public supply of the residents at Chiddingfold and Dunsfold, in Sussex, where hitherto some difficulty has been experienced with the wells in the district. Mr. S. Barrow, of Dunsfold, has some water-works of his own, and to them he proposes to add by purchase the works at Brook, owned by a clergyman. Some of the members of the Rural District Council at Hambledon, however, are opposed to the introduction of a private Water Company; and consideration is to be given to the matter by a Special Committee of the Council.

We have received from the Davis Gas-Stove Company, Limited, two neatly got-up booklets, in artistic coloured wrappers, which they are issuing in connection with the radiator department of their business. One is entitled "House Warming Up to Date," and is intended to appeal more particularly to householders and private individuals; while the other, which bears the title of "Steamless Heating," deals with the subject in a more detailed and technical manner, and is written especially for gas engineers, architects, and other professional gentlemen of this class to whom such a system of heating would be likely to appeal. Both booklets are printed in colours, and are attractive in appearance.

The beggarly salaries paid by some municipal corporations have often been unfavourably commented upon in the "JOURNAL" and other publications; but little improvement is apparent. One of the London District Councils recently advertised for an Accountancy Clerk, not over 28 years of age, at a commencing salary of £50 per annum. By mistake, the salary appeared in the advertisement as £30. Among many satirical replies received one was as follows: "I have a desire to settle down in a permanent position, being married and having a family to support. The 11s. 6d. per week salary which I shall receive, if appointed, will probably pay the rent of a house suitable for the position of a municipal officer; and while I am attaining the maximum salary, I hope to be able to beg from a few friends some bread upon which to live, together with some left-off garments with which to appear at the municipal buildings at my daily work. . . . I am an efficient organist, and prepared to officiate at the parish church every Sunday; likewise a first-rate gardener, and would keep the grounds of the town hall in order in my spare time. In cases of emergency, I could deputize as tram or motor-car driver, or as town clerk, having a thorough knowledge of the law. . . . I would gladly study to qualify for any other duties you might desire me to perform."

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situation Vacant.

ASSISTANT DISTRICT INSPECTOR. Reading Gas Company.

Situation Wanted.

ENGINEER WITH EXPERIENCE IN RETORT ERECTION. No. 5119.

TRAVELLER - REPRESENTATIVE (WITH LONDON OFFICES). No. 5125.]

SECRETARY, MANAGER, OR ACCOUNTANT. No. 5115.

Plant (Second-Hand) Wanted.

ANNULAR CONDENSERS, &c. Aylesbury Gas Company.

Plant, &c. (Second-Hand), for Sale.

CARBURETTED WATER-GAS PLANT, INCLUDING CONDENSERS AND TOWER SCRUBBER. Shanghai Gas Company.

Plant, &c. (Second-Hand), for Sale—*continued.*

MASON'S PRODUCER-GAS PLANT, COAL-ELEVATOR, &c. Reading Electric Supply Company.

STATION METER AND GOVERNOR. Widnes Gas-Works.

BOILER, ENGINE, AND WASHER. Dorchester Gas-Works.

Patent Licences.

ACETYLENE GENERATORS, LAMPS, &c. Haseltine, Lake, and Co., Chancery Lane, W.C.

Meetings.

BARNET GAS AND WATER COMPANY. Holborn Restaurant, Aug. 31, Twelve o'clock.

MITCHAM AND WIMBLEDON GAS COMPANY. Offices, Aug. 31, Three o'clock.

RIDDINGS DISTRICT GAS COMPANY. London Office, Aug. 31, Three o'clock.

TENDERS FOR

Coal and Cannel.

LIVERPOOL LIGHTING DEPARTMENT. Tenders by Sept. 2.

Boilers, Engines, and Exhausters.

SMETHWICK GAS DEPARTMENT. Tenders by Aug. 26.

WALLASEY GAS DEPARTMENT. Tenders by Sept. 15.

Tar.

BRADFORD GAS DEPARTMENT. Tenders by Sept. 16.

Washer and Tar Extractor.

WALLASEY GAS DEPARTMENT. Tenders by Sept. 15.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 437.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17⅞—18¼	..	5 9 7
898,955	10	,,	7	Do. 7 p.c.	12¾—13	..	5 7 8
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	96—98	..	4 0 0
200,000	5	May 27	6⅓	Bombay, Ltd.	5⅞—5⅞	..	5 10 8
40,000	5	,,	6⅓	Do. New, £4 paid	4⅞—4⅞	..	5 12 5
50,000	10	Feb. 25	15†	Bourne-	28¾—29¼	..	5 2 6
311,810	10	,,	7	mouth Gas } B 7 p.c.	16⅞—17¼	..	4 1 2
75,000	10	,,	6	and Water } Pref. 6 p.c.	15⅝—15⅞	..	3 15 7
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	250—253*	+2	4 18 10
300,000	,,	,,	5⅓	Do. New	190—192*	..	4 19 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—122*	..	4 2 0
206,250	,,	June 11	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
220,000	Stk.	Mar. 12	10⅔	Brighton & Hove Orig.	213—215	+1	5 0 0
246,320	,,	,,	7⅓	Do. A Ord. Stk.	154—156	..	4 19 4
461,000	20	Apl. 16	10	British	43—43⅞	..	4 11 11
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	119—121	..	4 19 2
165,700	,,	,,	4½	Do. B 3½ p.c.	89—91	..	4 18 11
82,278	,,	,,	5½	Do. C 5 p.c.	108—110	..	5 0 0
50,000	,,	June 25	3½	Do. 3½ p.c. Deb.	88—90	..	3 17 9
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13⅜—14	..	5 0 0
250,000	Stk.	June 25	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	4¼—5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5½—6	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48½—49½	..	6 1 3
100,000	Stk.	June 25	4½	Do. 4½ p.c. Deb. Stk.	82—84	..	5 7 2
157,153	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	106½—108½*	..	4 12 2
1,491,280	Stk.	Mar. 12	5⅓	Commercial 4 p.c. Stk.	109—111	+1	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do.	105—107	+1	4 13 5
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800,000	Stk.	,,	5	Continental Union, Ltd.	96—98	..	5 2 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—140	..	5 0 0
491,470	Stk.	—	5	Derby Con. Stk.	121—123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	Mar. 31	5	East Hull 5 p.c. Ord.	100—102	..	4 18 0
486,093	10	July 14	12	European, Ltd.	24¼—24⅝	..	4 17 0
354,060	10	,,	12	Do. £7 10s. paid.	18¼—18⅝	..	4 16 0
15,141,545	Stk.	Aug. 12	4⅜	Gas } 4 p.c. Ord.	104—105*	+1⅜	4 8 10
2,620,000	,,	,,	3⅜	light } 3½ p.c. max.	87—89*	+¾	3 18 8
3,799,735	,,	,,	4	and } 4 p.c. Con. Pref.	103—105*	..	3 16 2
4,193,975	,,	June 11	3	Coke } 3 p.c. Con. Deb.	85¼—86⅛	..	3 9 4
258,740	Stk.	Mar. 12	4⅜	Hastings & St. L. 3½ p.c.	93—95	..	5 0 0
62,500	,,	,,	6½	Do. do. 5 p.c.	118—120	..	5 4 2
70,000	10	Apl 29	11	Hongkong & China, Ltd.	17⅞—18¼	..	6 0 7
123,570	Stk.	Mar. 12	6½	Ilford A and C	141—143	..	4 10 11
65,782	,,	,,	5	Do. B	106—108	..	4 12 7
63,000	,,	June 25	4	Do. 4 p.c. Deb.	102—104	..	3 16 11
4,940,000	Stk.	May 13	8	Imperial Continental	179—181	..	4 8 5
473,600	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.	94—96*	+¾	3 12 11

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	120—122	..	4 18 4
561,000	Stk.	Feb. 25	10	Liverpool United A.	228—230	+2	4 6 10
718,100	,,	,,	7	Do. B	168—170	..	4 2 4
306,083	,,	June 25	4	Do. Deb. Stk.	104—106	..	3 15 6
75,000	5	June 11	6	Malta & Mediterranean.	4⅝—5⅛	..	5 17 1
560,000	100	Apl. 1	5	Met of } 5 p.c. Deb.	101—103	..	4 17 1
250,000	100	,,	4⅓	Melbourne } 4½ p.c. Deb.	102—104	+1	4 6 7
541,920	20	May 27	3⅓	Monte Video, Ltd.	12⅞—13	..	5 7 8
1,775,892	Stk.	July 29	4⅓	Newc'tle & G'tesh'd Con.	106½—107½	+1	4 3 9
518,795	Stk.	June 25	3⅓	Do. 3½ p.c. Deb.	91—93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19½—20	..	5 0 0
55,940	10	,,	7	Do. 7 p.c.	13—13⅜	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	137—139	..	5 15 1
60,000	5	Mar. 31	8	Ottoman, Ltd.	6⅛—6⅜	..	6 5 6
31,800	53	Feb. 25	13	Portsea Island A.	140—142	..	4 16 11
60,000	50	,,	13	Do. B.	132—134	..	4 17 0
100,000	50	,,	12	Do. C.	123—125	..	4 16 0
114,800	50	,,	10	Do. D and E.	103—105	..	4 15 3
398,490	5	May 13	7	Primitiva Ord.	7—7¼	..	4 16 7
796,580	5	July 29	5	Do. 5 p.c Pref.	5¼—5⅜	..	4 10 11
488,903	100	June 1	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
1,500,000	10	Apl. 29	8	River Plate Ord.	16¾—17¼	..	4 12 9
312,650	Stk.	June 25	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
250,000	10	Mar. 31	8	San Paulo, Ltd.	14—14½	..	5 10 4
62,500	10	,,	6	Do. 6 p.c. Pref.	12—12½	..	4 16 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49½—50½	..	4 19 0
135,000	Stk.	Mar. 12	10	Sheffield A	236—238	..	4 4 0
209,984	,,	,,	10	Do. B	233—235	..	4 5 1
523,500	,,	,,	10	Do. C	233—235	..	4 5 1
70,000	10	June 11	10	South African	13⅛—14	..	7 2 10
6,429,895	Stk.	Aug. 12	5⅜	South Met., 4 p.c. Ord.	119—121*	+⅜	4 8 1
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	84½—85½	..	3 10 2
209,820	Stk.	Mar. 12	8	South Shields Con. Stk.	153—155	..	5 3 3
605,000	Stk.	Aug. 12	5½	S'th Suburb'n Ord. 5 p.c.	118—120*	+⅜	4 11 8
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—122*	+½	4 2 0
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	122—124	..	4 0 8
502,310	Stk.	May 13	5	Southampton Ord.	110—112	..	4 9 3
120,000	Stk.	Aug. 12	6¾	Tottenham } A 5 p.c.	130—132*	+1⅜	5 4 2
453,940	,,	,,	5⅜	and } B 3½ p.c.	109—111*	+¾	4 16 7
149,470	,,	June 25	4	Edmonton } 4 p.c. Deb.	100—102	..	3 18 5
182,380	10	June 11	8	Tuscan, Ltd.	9—9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	111—113	..	4 8 6
255,636	Stk.	Feb. 25	6⅜†	Wands- } B 3½ p.c.	140—142	+1	4 13 4
79,416	,,	June 25	3	worth } 3 p.c. Deb. Stk.	73—75	..	4 0 0
895,872	,,	Aug. 12	5⅜	West Ham 5 p.c. Ord.	124—126*	+1⅜	4 5 4
210,000	,,	,,	5	Do. 5 p.c. Pref.	126—128*	+2½	3 18 2
253,300	,,	June 25	4	Do. 4 p.c. Deb. Stk.	110—112	+5	3 11 5

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MR. WM. CRANFIELD, F.C.S., in re- sponse to requests, has decided to extend the work he has been carrying on by Gas Classes in various Yorkshire Towns for the past Ten Years, and to organize postal courses of Tuition in "Gas Engineering" and "Gas Supply." Close personal attention will be given to the needs of each individual Student, and Expert Assistance has been engaged. All Inquiries treated confidentially.
Full Particulars on Application to No. 11, Avondale Place, Halifax.

THE UNIVERSITY OF LEEDS.

DEPARTMENTS of Gas Engineering and Fuel and Metallurgy and Civil, Mechanical, Electrical, and Mining Engineering.
The work of these Departments is carried on in Separate Blocks of Buildings specially equipped for Systematic Instruction. Prospectus may be had free on Application from the Registrar.
The next Session begins on Oct. 5, 1909, on which day the entrance Examination will be held at Ten a.m. and Two p.m.

ENGINEER, with Experience in Retort Erection, both Horizontal and Vertical, in England and Abroad, seeks an ENGAGEMENT where his Constructional Skill would be of Advantage.
Address No. 5119, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TRAVELLER, Gas Engineer, calling upon, and having Established Connection with, Gas and Water Companies, Corporations, &c., is prepared also to REPRESENT a Firm of Good Standing. West End Offices could be shared if desired.
Address No. 5125, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

READING GAS COMPANY.

WANTED, an Assistant District INSPECTOR. Age not to exceed 35 Years. Applicants are requested to send in full Particulars of their Age and Training, together with *copies* of recent Testimonials, and to state Wages required. No one need Apply who has not a thorough practical knowledge of internal Gas-Fitting Work, Incandescent Burners, &c., &c. A special knowledge of Main Laying is not necessary.
Applications to be sent in as soon as possible addressed to the Engineer, Gas-Works, Reading.

PURIFIERS—Set of Four, 12 feet Square, fixed complete, £300. A bargain. Also Four 6 feet Square, Two 8 feet, Four 8 feet, and Two 12 feet square PURIFIERS. Cheap.
Firth Blakeley's, Thornhill, Dewsbury.

GASHOLDERS—Splendid, 45 feet dia- meter, and New STEEL TANK fixed complete, £600 to Plan and Specification. Also 50 feet Single-Lift and 50 feet Double-Lift. Cheap, with STEEL TANKS. Can be seen temporarily erected.
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CONDENSERS—Clapham's, also Cutler's Water-Tube CONDENSERS. Pipe CONDENSERS, 4-inch to 10-inch diameter. Annular CONDENSERS, 8-inch, 10-inch, and 12-inch. Erected Complete and Cheap.
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THE Shanghai Gas Company, Limited, have for Disposal Two Sets of Humphreys and Glasgow's CARBURETTED WATER-GAS PLANT which have become too small for the Company's requirements, and have been displaced by a larger Plant.
Each set is capable of an output of 225,000 Cubic Feet per Twenty-Four hours.
The Plant is complete in every respect, and includes an Extra Set of Annular Condensers, and a Tower Scrubber, together with all necessary Valves and Connections.
Further Particulars can be obtained from the undersigned.
H. King Hiller,
Engineer-in-Chief.

FOR SALE—Complete Mason's Producer- Gas Plant with Coal-Elevator, Gasholder, and all Accessories.
For full Particulars, Apply to the Reading Electric Supply Co., Limited, 55, Vastern Road, Reading.

FOR SALE—A 20,000 Cubic Feet per hour STATION METER, with 12-inch Valves and Connections Complete. Good Condition. Also a 14-inch STATION GOVERNOR (W. Cowan's Patent).
Further Particulars from the Gas-Works, Widnes.

FOR SALE—Two Cornish Boilers, 10 ft. 9 in. by 4 ft. 9 in., including some Mountings, in good Condition. Insured for 60 lbs. working pressure. One Vertical TABLE ENGINE, 4-H.P. by Cockey and Sons; also a Cockey's HORIZONTAL WASHER, for 250,000 feet per diem. Being removed for extensions.
Frank Osmond, Gas-Works, Dorchester.

WANTED, a Set of Good, Second-Hand ANNULAR CONDENSERS, with 12-inch Valves and Connections Complete.
Particulars to G. Lane, Gas-Works, Aylesbury.

CITY OF LIVERPOOL.

THE Lighting Sub-Committee invite TENDERS for the Supply of 2000 Tons of GAS COAL or SLACK and 500 Tons of CANNEL to the Corporation Gas-Works at Fazakerley, for delivery over a period of Twelve Months.
Forms of Tender, returnable on or before Ten a.m., on the 2nd of September next, may be obtained on Application to Mr. A. G. Smith, Lighting Superintendent, Hood Street, Liverpool.
E. R. Pickmere,
Town Clerk.
Municipal Offices,
Aug. 9, 1909.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Bradford Corporation are prepared to receive TENDERS for the Purchase of their Surplus TAR for One Year.
Form of Tender, with any further Information required, may be had on Application to Mr. C. Wood, Gas Engineer, Town Hall.
Sealed Tenders, endorsed "Tender for Tar," to be sent to me on or before Thursday, the 16th of September, 1909.
The highest or any Tender will not necessarily be accepted.
Frederick Stevens,
Town Clerk.
Town Hall, Bradford,
Aug. 11, 1909.

COUNTY BOROUGH OF SMETHWICK.

ENGINES AND EXHAUSTERS.

THE Gas Committee are prepared to re- ceive TENDERS for the Supply, Delivery, and Fixing of two Sets of COMBINED ENGINES and ROTARY EXHAUSTERS to pass 100,000 Cubic Feet per Hour each.
Further Particulars and Specification may be obtained from Mr. Vincent Hughes, Engineer, at the Gas-Works.
Tenders, endorsed "Exhausters," and addressed to the Chairman of the Gas Committee, to be delivered to the undersigned not later than the 26th inst.
The Committee do not undertake to accept the lowest or any Tender.
W. J. Sturges,
Secretary.
Council House, Smethwick.

WALLASEY URBAN DISTRICT COUNCIL.
(Gas and Water Department.)

TO ENGINEERS, BOILER MAKERS, AND MAKERS OF GAS PLANT.

THE Wallasey Urban District Council are prepared to receive TENDERS for the Supply, Delivery, and Erection of a TAR EXTRACTOR, ROTARY WASHER, ROTARY EXHAUSTER and ENGINE, and LANCASHIRE BOILER, at the Gas-Works, Poulton-cum-Seacombe.
Plans may be inspected, and *copies* of Specifications obtained, on Application to the Engineer, Mr. J. H. Crowther, at his Office, Dock Road, Seacombe.
Sealed Tenders, on Forms provided for the purpose, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Extractor and Washer," "Tender for Exhauster and Engine," "Tender for Lancashire Boiler," as the case may be, to be delivered per Post, at my office as below, not later than the morning of Wednesday, the 15th of September, 1909.
Tenders arriving after that time will not be considered.
The Contractor will be required to enter into a Bond, with approved Sureties, for the due Performance of the Contract.
The Council do not bind themselves to accept the lowest or any Tender.
By order,
H. W. Cook,
Clerk and Solicitor to the Council.
Public Offices, Egremont,
Cheshire, Aug. 14, 1909.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Holborn Restaurant, 218, High Holborn, London, W.C., on Tuesday, the 31st day of August, 1909, at Half-past Twelve o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last; to declare a Dividend; and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 18th to the 31st of August, both inclusive.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 6 & 7, Queen Street,
Cheapside, London, Aug. 9, 1909.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, Nos. 6 & 7, Queen Street, Cheapside, in the City of London, on Tuesday, the 31st day of August, 1909, at Three o'clock in the Afternoon, to receive the Report of the Directors and the Accounts for the Half Year ended the 30th day of June last; to declare a Dividend; and to transact the General Business of the Company.

And NOTICE IS HEREBY FURTHER GIVEN, that, immediately after the transaction of the Business of the above Meeting, an EXTRAORDINARY MEETING of the Shareholders of the above Company will be held for the purpose of authorizing the raising, by the creation and issue of new Preference Shares or Stock of the Company, a sum not exceeding in the whole (including any premiums which may be obtained) £5000; being a further part of the additional Capital of £20,000 authorized by the Riddings District Gas Order, 1903.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 6 & 7, Queen Street,
Cheapside, London, Aug. 8, 1909.

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

(INCORPORATED BY ACTS OF PARLIAMENT, 1867 AND 1907.)

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Offices of the Company, Western Road, Mitcham, in the County of Surrey, on Tuesday, the 31st day of August, 1909, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and a Statement of Accounts for the half-year ended the 30th day of June last; to declare a Dividend; and for General Business.

The REGISTER of TRANSFERS of the CONSOLIDATED ORDINARY STOCK WILL BE CLOSED from the 16th inst. until after the Meeting.

By Order of the Directors,
BENJAMIN GREEN,
Secretary.

Offices and Works:
Western Road, Mitcham,
Aug. 10, 1909.

THE Proprietor of the Patents No. 7188 of 1901, for "IMPROVEMENTS IN OR RELATING TO ACETYLENE GAS-LAMPS or GENERATORS;" No. 11,612 of 1902, for "ACETYLENE GAS-LAMP for TABLE USE; No. 23,629 of 1903, for "IMPROVEMENTS IN ACETYLENE GAS-GENERATORS;" No. 10,185 of 1905, for "IMPROVEMENTS IN ACETYLENE GAS-GENERATORS" is desirous of entering into Arrangements, by way of LICENCE and Otherwise, on Reasonable Terms, for the purpose of EXPLOITING the same and ensuring their full Development and Practical Working in this Country.

All Communications should be addressed in the first instance to HASELTINE, LAKE, AND CO., Chartered Patent Agents and Consulting Engineers, 7 & 8, Southampton Buildings, Chancery Lane, LONDON, W.C.

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Gas Bags for repairing Mains, All Seams Stitched and Taped.

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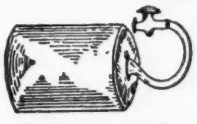

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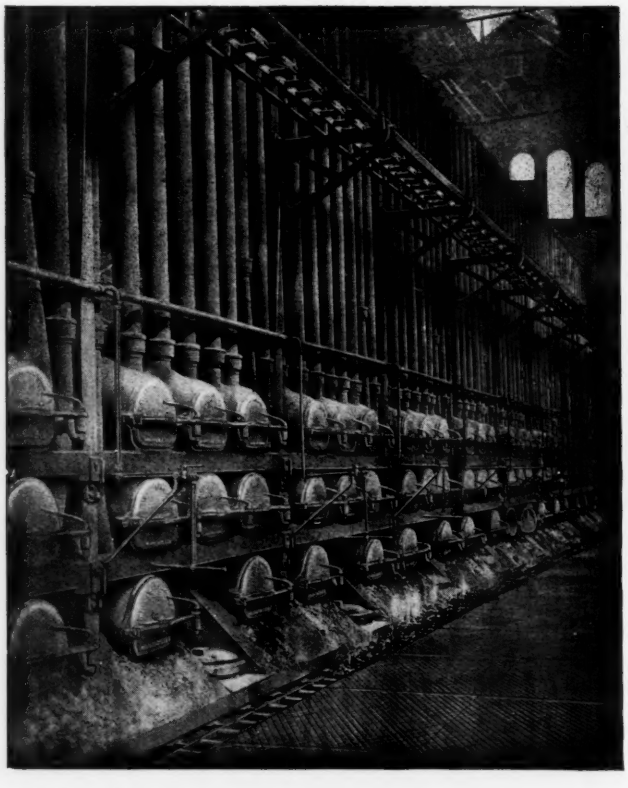

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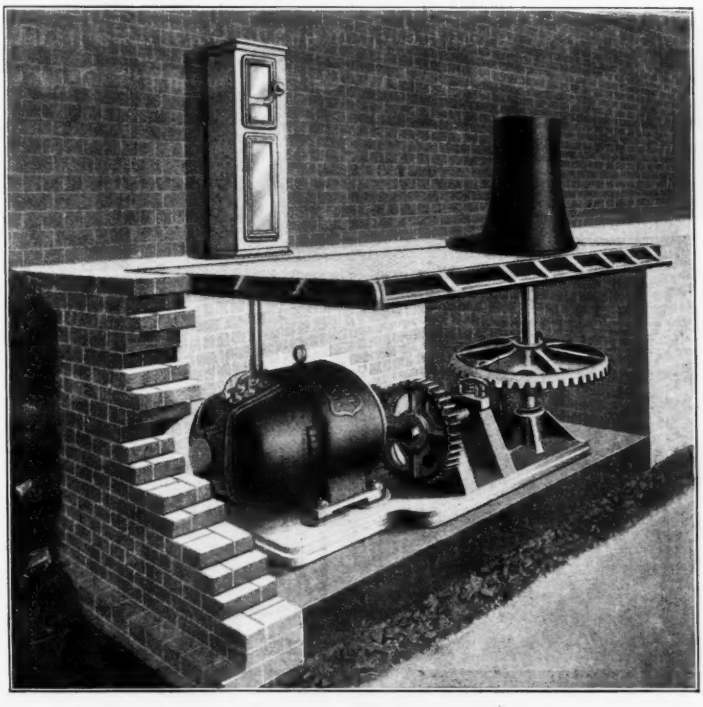

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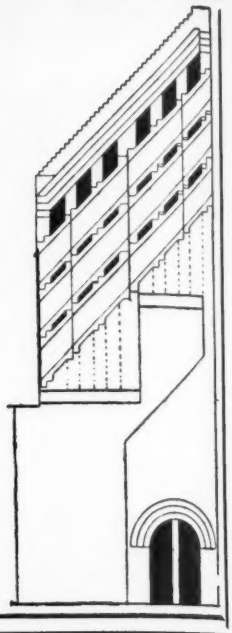

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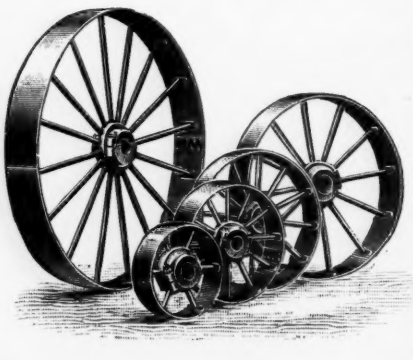

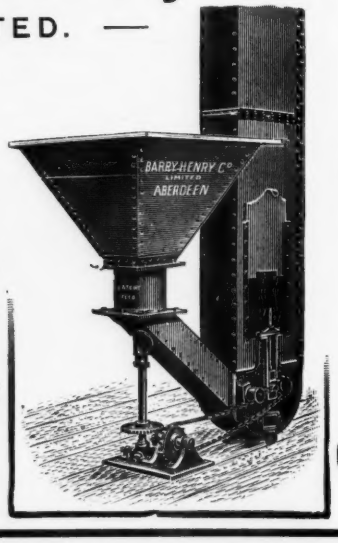

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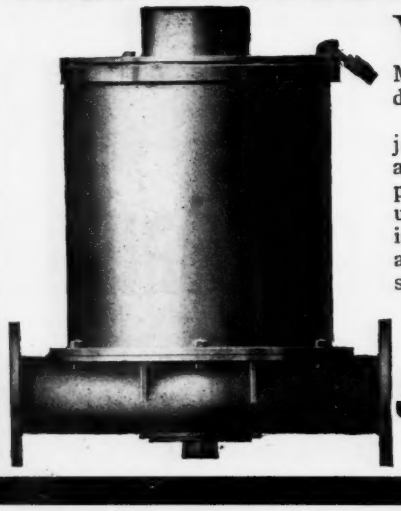

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This Governor is correctly compensated, and is so accurately adjusted that it will work as an ordinary low pressure Governor so long as the Inlet pressure is at least five-tenths more than the required Outlet pressure. This is particularly useful in the event of the Main being used as an ordinary low pressure distribution Main. The Governor is usually supplied for Inlet pressure of up to 5 lbs. per square inch, and Outlet pressure of from Zero to 6 inches; but, of course, it can be specially prepared to suit any desired range of pressure.

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LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

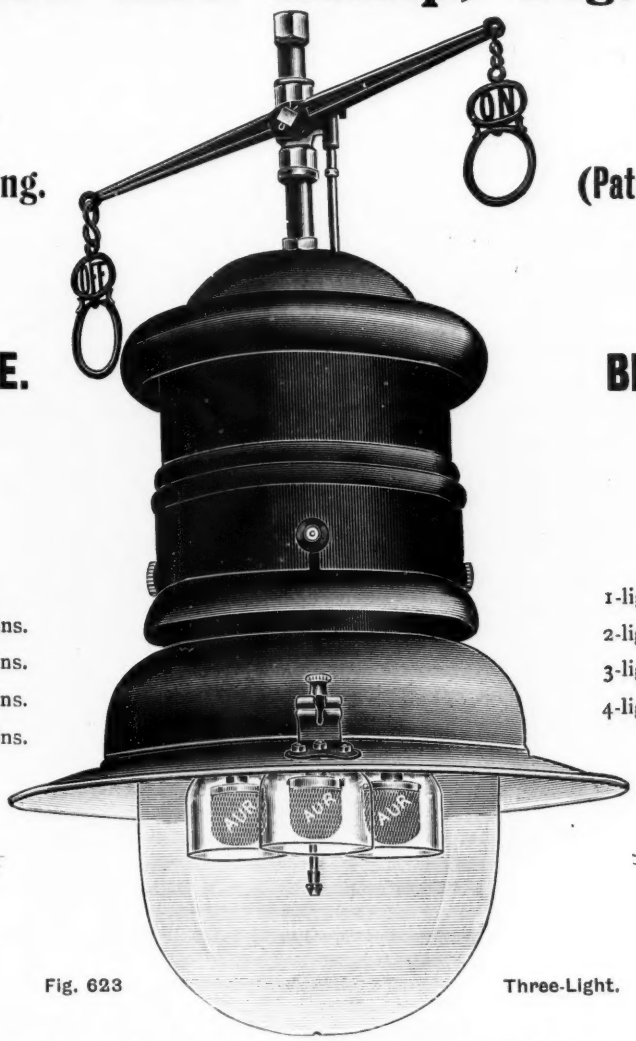

Fig. 623 Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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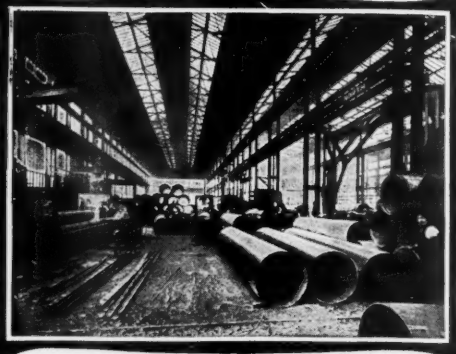
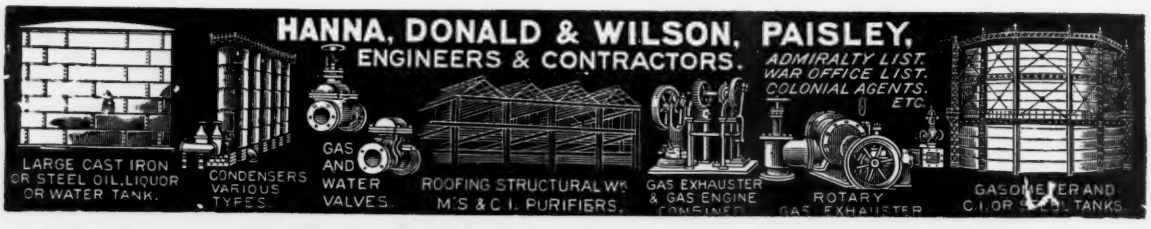


Interior View of Works
Employed in the Manufacture of
WELDED STEEL MAINS
for WATERWORKS *Etc.*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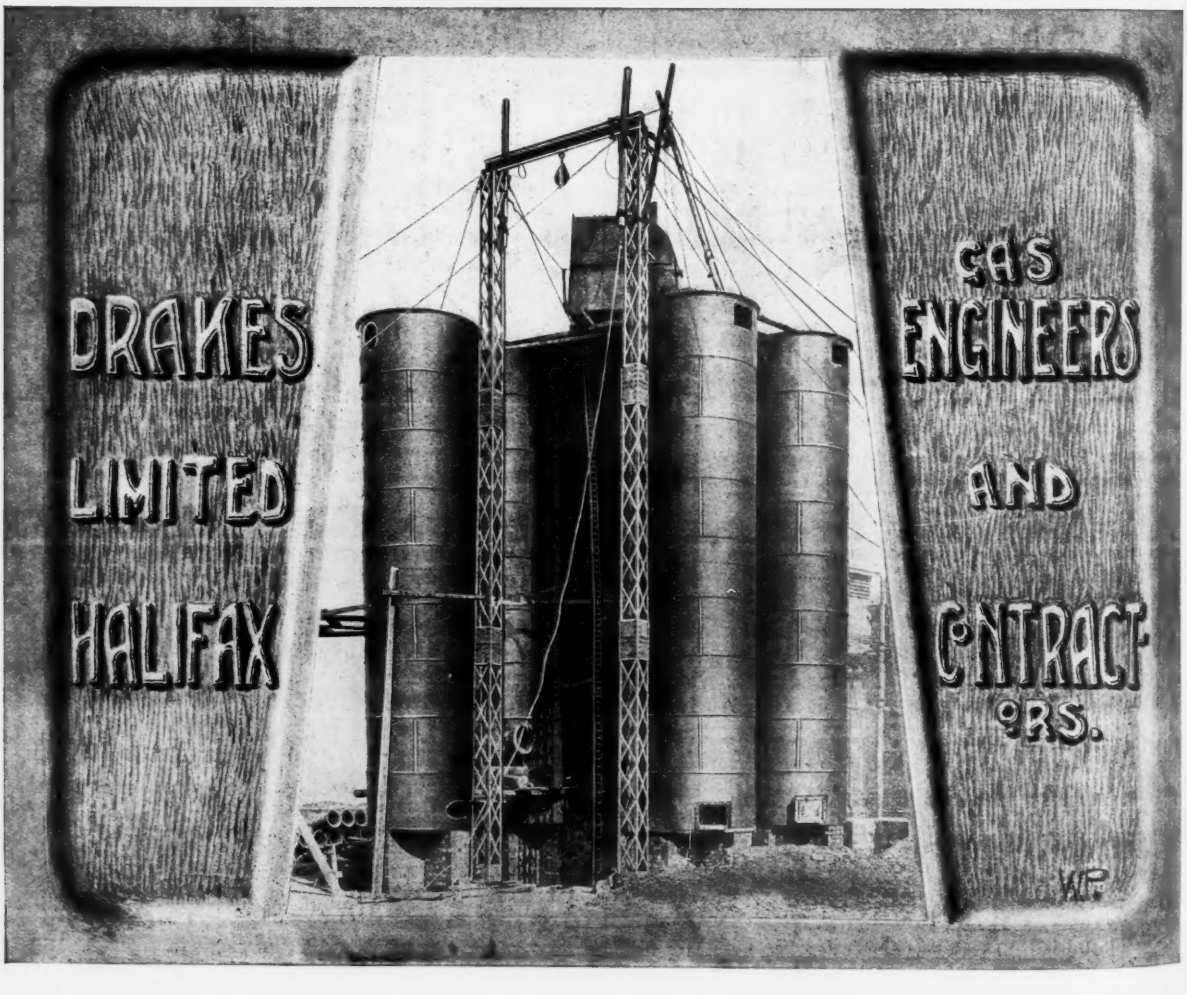
GASOMETER AND C.I. OR STEEL TANKS



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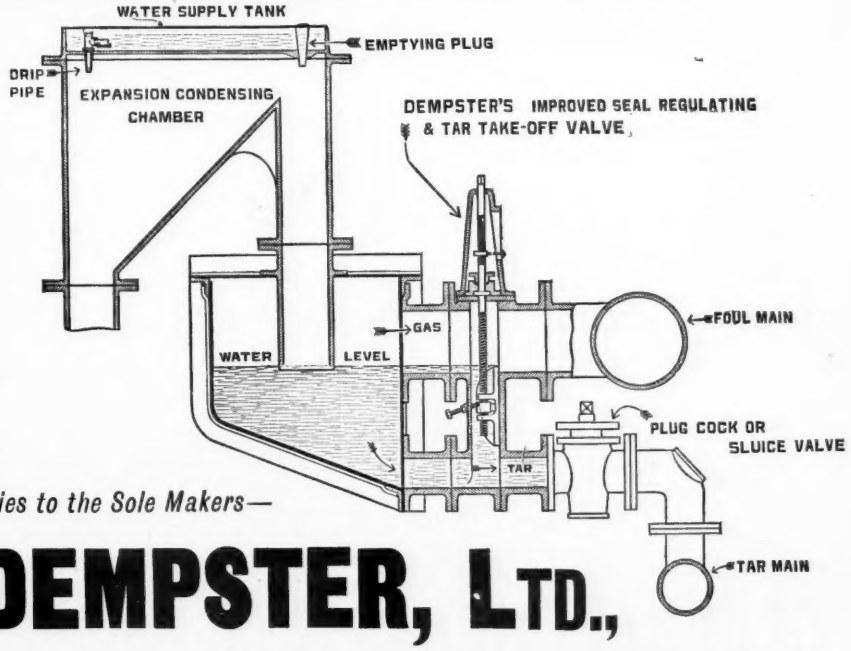

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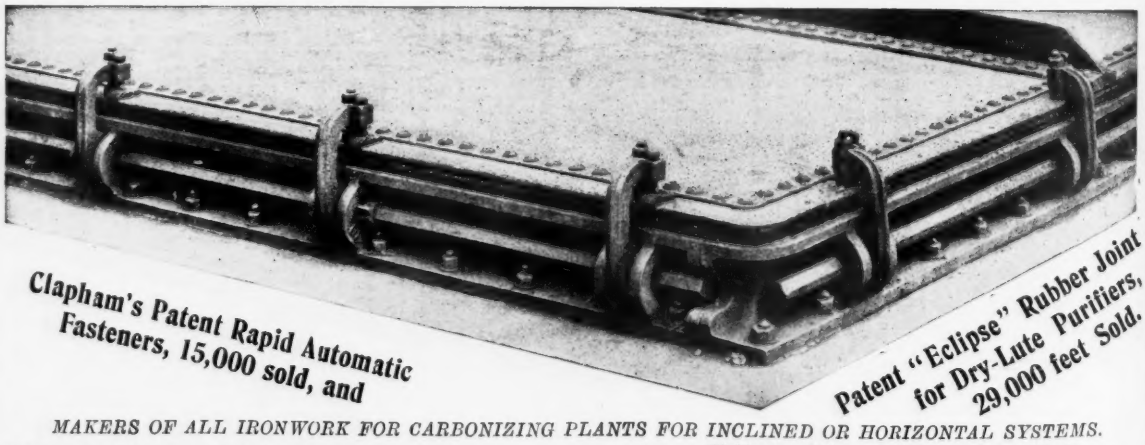

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